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Full Name of Author — Nom complet de l'auteur

JANICE COLES

Date of Birth — Date de naissance

13th JULY, 1942

Country of Birth — Lieu de naissance

ENGLAND

Permanent Address — Résidence fixe

BOX 2127, SPRUCE GROVE, ALBERTA, T0E 2C0

Title of Thesis — Titre de la thèse

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University — Université

UNIVERSITY OF ALBERTA

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1983

Name of Supervisor — Nom du directeur de thèse

DR. JEAN E. ROBERTSON

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COGNITIVE PROCESSES ENGAGED DURING TASKS OF READING AND LISTENING COMPREHENSION

by

Janice Coles

(C)

A THESIS

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(Signed) J. Coles

PERMANENT ADDRESS:

Box 2127,

Spruce Grove,

Alberta, T0E 2C0.

DATED 17th December, 1982

THE UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled Cognitive Processes Engaged During Tasks of Reading and Listening Comprehension submitted by Janice Coles in partial fulfilment of the requirements for the degree of Master of Education.

Jean E. Laberton
Supervisor

Fern Snart

W. V. Tagor

Date December 17, 1982

ABSTRACT

Within this study the receptive language comprehension processing strategies of fourth grade students were investigated both quantitatively and qualitatively. A quantitative evaluation of achievement levels for able and less able readers established inter-group instructional comprehension levels for reading and listening. A qualitative analysis of recall protocols evaluated inter- and intra-group processing strategies in order to determine (a) whether unitary thought processes were engaged during tasks of silent reading and listening comprehension, and (b) whether similar cognitive processing strategies were used by both able and less able readers when processing instructional level passages of written and narrated prose.

A sample of forty grade four students was selected and assigned to one of two equal groups of able and less able readers on the basis of their performance on the comprehension subtest of the Gates-MacGinitie Reading Test, Level D, Form 2 (1978), and the non-verbal section of the Canadian Cognitive Abilities Test, Level B, Form 1 (1974).

Each child was asked to silently read, and listen to, graded passages of prose followed by immediate recall of passage information. Unaided recalls were tape recorded for subsequent transcription and analysis. The transcribed recall protocols were divided into clausal units and analyzed according to Fagan's Comprehension categories for protocol analysis (Fagan, in press; c.f. Appendix C).

Statistical treatment of the data consisted of a two-way analysis of variance in instructional level performances, a two-way analysis of variance with repeated measures on the comprehension categories, and t-tests to clarify a significant inter-group difference obtained for one of the comprehension categories.

The findings indicated that (a) performance levels of able readers were significantly greater than those of less able readers on the specific tasks of silent reading and listening comprehension, (b) the processing of instructional level input elicited very similar thought processes from children regardless of mode of input, and that (c) able and less able readers processed instructional level input in a largely similar manner. A significant difference was obtained, however, in the amount of syntheses and summaries provided by able readers in the listening treatment.

It was concluded that, irrespective of the mode of input, unitary thought processes are embedded in tasks of reading and listening comprehension. Furthermore it is apparent that able and less able readers process instructional level information in relatively similar manners, although it is acknowledged that able readers demonstrate an increased facility for synthesizing and organizing auditorially processed materials. These conclusions support the view that listening and reading strategies should be integrated within the classroom, and that teaching and learning materials should match a child's independent and instructional comprehension levels. Further research on the apparent

developmental trends in reading and listening is recommended to highlight instructional strategies necessary at all grade levels.

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CHAPTER I

INTRODUCTION AND STATEMENT OF THE PROBLEM

The Problem

Much of the daily instruction which takes place in elementary schools centres on the receptive language channel modalities of reading and listening, the former receiving more formal emphasis than the latter. Whether children participate in reading or listening activities, the intention is that they comprehend the presented message. Comprehension is achieved when the child uses appropriate cognitive processing strategies to achieve a match between his linguistic and world knowledge, and the linguistic and world knowledge proffered in the written or spoken message. When appropriate processing strategies are activated dynamic interaction occurs as the child classifies, establishes relationships, infers, synthesizes, and incorporates relevant information within suitable cognitive schema for future retrieval and recall (Brown, 1975; Fagan, 1978; Rumelhart, 1977).

If the processing of written or spoken language is viewed within the larger context of the child as an information processor then the research problem, focusing on the cognitive processing strategies employed by fourth grade readers and listeners, lies within the domain of cognition; indeed, within the encompassing area of "thinking" itself.

As long ago as 1917, Thorndike conceptualized the reader as being an active thinker. The same conceptualization may be applied to the listener. Both reader and listener must activate reasoning abilities in order to "select, repress, soften, emphasize, correlate and organize" incoming information (Thorndike, 1917, p. 329). Whilst many researchers have studied the cognitive processing strategies employed during tasks of reading comprehension (Beebe, 1981; Brailsford, 1981; Brake, 1981; Clarke, 1981; Kavanagh, 1981; Schienbein, 1978), relatively minimal research of the same nature has taken place in the field of listening comprehension. Walker (1973), speaking of processing, states:

> There seems to be little doubt that up to the point of deciding what the message is the reader or listener has been involved in selective and reconstructive activity. (Walker, 1973, p. 38)

Research in listening comprehension, however, has tended to concentrate on potential achievement level correlations between performances on tasks of reading and listening comprehension. Smiley et al (1977) and Sticht et al (1974) found that less able readers tend to be less able listeners and that, at the elementary school level, standardized test scores indicate that performance in listening comprehension generally exceeds performance in reading comprehension across all ability levels. Correlations are nebulous and, with the exception of Walker (1973), most researchers have been more concerned with achievement levels than with the processes engaged to attain those levels. However, when the various

research studies are viewed together from a holistic standpoint, it would seem that the difference between effective and less effective comprehension of reading or listening tasks may lie within the nature of the cognitive processing strategies employed during the processor's interaction with the author's message.

Comprehension is achieved by means of interactive processing which establishes relationships between conceptually understood ideas. It is suggested, in the present study, that the cognitive processing strategies employed by both readers and listeners share the same nature within the encompassing framework of information processing; within the area of "thinking" itself (Thorndike, 1917). If such is the case, when children are presented with reading and listening tasks which match their overall reasoning ability they should use similar processing strategies in order to comprehend the written or spoken message.

Purposes of the Study

The research problem has two dimensions, hence the study has been designed to elicit findings in response to the following questions:

1. Do fourth grade students, in their fourth year in school, employ similar cognitive processing strategies when engaged in tasks of reading and listening comprehension, presented at individual instructional levels?
2. When engaged in tasks of reading and listening

comprehension presented at individual instructional levels, do less able readers use similar cognitive processing strategies to those used by able readers, at the grade four placement level?

If the findings of the study result in affirmative responses to both questions then reading and listening activities, often viewed as being separate and distinct, may be linked together more clearly within the information processing framework.

Definition of Terms

Terms, as used in this study, are defined as follows:

Comprehension: The understanding which evolves during the reader's or listener's cognitive interaction with the written or spoken message, as he achieves a match between his linguistic and world knowledge and the linguistic and world knowledge imparted in the text.

Information Processing: The processing of written or auditorially presented information in a manner that is meaningful for the processor.

Reconstruction of an author's message: The mental activity incurred by the reader or listener, interacting with the written or spoken message, as he activates processing strategies in an attempt to achieve a match between his own world and linguistic knowledge and that of the author.

Narrated Passage: A passage of written prose, narrated by a Western Canadian English speaker.

Transmitted Message: A silently read or narrated passage of continuous discourse.

Continuous Discourse: The meaningful, connected language of a passage read silently or narrated.

Able Readers: Fourth grade students performing at or above the seventy-third percentile on the comprehension subtest of the Gates-MacGinitie Reading Test, Level D, Form 2 (1978), and with a non-verbal I.Q. score of eighty-five or above on the Canadian Cognitive Abilities Test, Level B, Form 1 (1974).

Less Able Readers: Fourth grade students performing at or below the thirty-fourth percentile on the comprehension subtest of the Gates-MacGinitie Reading Test, Level D, Form 2 (1978), and with a non-verbal I.Q. score of eighty-five or above on the Canadian Cognitive Abilities Test, Level B, Form 1 (1974).

Cognitive Processing Strategies: The reasoning procedures engaged, consciously or subconsciously, by a reader or listener attempting to make sense of a written or narrated passage of discourse. In this study the reasoning procedures are reflected in Fagan's Comprehension categories for protocol analysis (Fagan, in press). The latter are detailed in chapters two and three and Appendix C of this study.

Unaided Recall: A standard term used for the verbal recall of reconstructed passage details, prompted only by the researcher's preceding instructions, "This story is called (title). Read the story silently (or, "Listen

to the story --") and tell me about the story when you have finished." On task completion the child is reminded, "Tell me about the story (title)."

N.B. Whilst the word "story" is not semantically appropriate in terms of describing the presented passages, it is more familiar to the child than the term "passage" and, as such, is used accordingly.

Total Recall: The combination of accurate information verbalized by the child during unaided recall, and the child's correct responses to subsequent questions which elicit the comprehension of additional passage information not provided in the unaided recall.

Recall Protocol: After mazes have been removed, the verbatim transcription of the child's unaided recall of passage information.

Clausal Unit: A clausal unit contains a finite subject, a finite verb, and may be either main or subordinate, e.g. he heard a noise.

Instructional Comprehension Level: The final level on Forms A and B of the Standard Reading Inventory (McCracken, 1966), for which the child's total recall of passage information achieves a raw score of 70% or above.

Hypotheses and Rationale

In order to achieve the purposes of this study two types of hypotheses were formulated and tested. Directional hypotheses (One: A and B) were used where previous research had provided strong indications that the hypotheses should

be supported by the research findings. Null hypotheses (Two: A, B, C, D, and E) were used where insufficient evidence was available to ensure that the hypotheses, as posed, would be supported by the research findings.

Hypothesis One A: For able readers, performances in listening and reading comprehension will be significantly greater than those of less able readers for both treatments, as reflected in instructional levels.

Hypothesis One B: For able and less able readers, performance in listening comprehension will be significantly greater than performance in reading comprehension, as reflected in instructional levels. (c.f. Table One)

Clearly, able readers presented with at or above grade placement level tasks of reading comprehension process with a higher degree of proficiency than do less able readers. Comparative researchers, using standardized and equivalent or identical tests, have indicated that (a) able readers tend to be able listeners, whereas less able readers tend to be less able listeners (Smiley et al, 1977; Sticht, 1974), and that (b) performance in listening comprehension tends to produce a higher achievement level than does performance in reading comprehension, across ability ranges at the elementary school stage. It seemed reasonable to predict, therefore, that Parts A and B of Hypothesis One would be supported in the research findings.

Previous studies researching processing similarities and

Table One

Performance Scores As Reflected in Instructional Levels

GRADE FOUR READERS	
ABLE > LESS ABLE	ABLE AND LESS ABLE
Hypothesis One A	Hypothesis One B
Listening and Reading Comprehension	Listening Comprehension > Reading Comprehension

differences during reading and listening comprehension have approached the problem from various vantage points, e.g. Walker (1973) examined the processing of written and spoken dialogue; Guthrie and Tyler (1976) and Oaken, Wiener and Cromer (1971) ensured that each word presented for processing was within the sight or hearing vocabulary recognition of the children sampled. However, whilst Walker's written dialogue was transcribed from the spoken form, some syntactical changes were necessary due to the conventions required for printed materials. The latter tend to be shorter in length than corresponding oral versions with mazes, audible pauses and fillers having been omitted (Walker, 1973, pp. 106 and 107); hence, although the original content had been preserved, "... the natural style of the writer [used] to achieve coherent, clear sentences ..." (Walker, 1973, p. 106) may have neutralized the equivalence of the presentations to some extent. Moreover, whilst each spoken and written word in the above studies was presumed (Walker, 1973) or stated (Guthrie and Tyler, 1976; Oaken, Wiener and Cromer, 1971) to lie within the sight/hearing vocabulary recognition of each child, the ability to recognize isolated words does not ensure that effective comprehension will ensue, when those words are combined to produce the concepts and relationships described in continuous discourse.

The present study examines processing performances on tasks of reading and listening comprehension at each child's instructional level. Instructional level performances contain the firmly entrenched implication that each child

understands, adequately, the concepts and relationships embedded within both of the instructional level passages processed. Hence, whilst instructional level passages may vary in terms of grade level standing between children and between the two tasks, the assumption that similar cognitive processes must be engaged to achieve instructional levels implies equivalence for the purposes of analytical comparison. Whilst the outcome of parts A and B of Hypothesis One might be predicted with a high degree of certainty, it is by no means certain how extensive the differences between reading and listening comprehension performances will be. The research findings for Hypothesis One will demonstrate the extent of processing differences, in terms of performance levels, between (a) able and less able fourth grade readers, and (b) tasks of reading and listening comprehension.

Hypothesis Two: There are no significant differences between the cognitive processing strategies employed by able and less able readers during the processing of instructional level tasks of reading and listening comprehension, as reflected in Fagan's Comprehension categories for protocol analysis (Fagan, in press) (c.f. Table Two):

A There are no significant differences in the number of Text Exact categories recalled by able and less able readers on tasks of reading and listening comprehension.

B There are no significant differences in the number of Text Specific categories recalled by able and less able readers on tasks of reading and listening comprehension.

Table Two

The Engagement of Cognitive Processing Strategies
as Reflected in Hypothesis Two

FOURTH GRADE ABLE AND LESS ABLE READERS USE SIMILAR STRATEGIES FOR READING AND LISTENING COMPREHENSION:				
Verbatim/Almost Verbatim Recall	Recall of Specific Textual References	Synthesized or Summarized Recall	Recall Additions Based on Experiences	Recall of Incorrectly Processed Information
Hypothesis Two A	Hypothesis Two B	Hypothesis Two C	Hypothesis Two D	Hypothesis Two E

C There are no significant differences in the number of Text Entailed categories recalled by able and less able readers on tasks of reading and listening comprehension.

D There are no significant differences in the number of Text Experiential categories recalled by able and less able readers on tasks of reading and listening comprehension.

E There are no significant differences in the number of Text Erroneous categories recalled by able and less able readers on tasks of reading and listening comprehension.

An examination of the thought processes in which a child engages during tasks of reading and listening comprehension must take into consideration the contents of the presented message (input) and the contents of the child's unaided recall of passage information (product). Whilst the input and product of receptive language comprehension are observable, the mental processes engaged are:

> ... neither overt nor readily available for analysis. Only through the input and the product can the researcher make inferences concerning the processing strategies [engaged] ... We cannot directly observe the mental activity involved. (Brailsford, 1981, p. 16)

The mental activity becomes accessible, in part, when the input is controlled and the verbalized product is analyzed. When the written or spoken message is a narrative passage, processed at the child's instructional receptive language comprehension level, his covert processing strategies as reflected in Fagan's Comprehension categories for protocol analysis (Fagan, in press) may be approached and examined through the analysis of his unaided recall of passage

information.

Hypothesis Two will be supported if the cognitive processing strategies employed during instructional level tasks of reading and listening comprehension are found to be similar, between tasks and for both groups. If such is the case then it would seem reasonable to hypothesize that, whilst presentation modes differ between reading and listening, the thought processes engaged stem from the single but vastly diverse entity of the child's general ability to reason. Fagan's comprehension categories allow the researcher some access to the child's reasoning abilities in order to test this central hypothesis.

Hence, statistical analyses of the cognitive processes engaged by fourth grade children during instructional level tasks of reading and listening comprehension should indicate whether the nature of the processing is similar for both tasks, and whether both able and less able readers process the input in a similar manner.

Significance of the Study

If both hypotheses are supported by the research findings, two major implications will emerge. During regular classroom instruction, individualization occurs to a greater or lesser degree depending upon the teacher's commitment to such an approach, the size of the class, and the content of the presented material. If the current research findings support the hypothesis that children process with an acceptable degree of proficiency when the

content to be processed is presented at their individual, instructional receptive language comprehension levels, then an individualized approach providing only independent and instructional level materials for each child may be recommended (Clarke, 1981).

The second implication, although applicable to regular classroom instruction, has more relevance in the resource room setting. Resource room remediation programs tend to focus directly upon the remediation of performance in specific subject areas, i.e. if a child's reading performance is considered to be below average it is likely that he will be required to progress through the stages of learning a hierarchy of skills which, many teachers believe, are central to achieving proficiency in reading; if the child's performance when required to listen is considered below average, the problem is generally deemed to be inappropriate attending behaviour resulting in lack of comprehension. Remediation in this instance almost invariably requires the child to attend to verbal directions and to produce appropriate responses on cue, in an attempt to lengthen his attention span and thus improve his comprehension. Both reading and listening comprehension remedial approaches may be beneficial for some students. For many students, however, the approaches are self-defeating since they deal with the observable surface problem rather than the underlying cause.

If the engagement of similar cognitive processing strategies during tasks of reading and listening comprehension becomes evident from the findings of this study, then the

remediation of receptive language comprehension difficulties may be more readily achieved for some children through training in the encompassing area of generalized information processing. There is support for such a notion in a recently completed study which examined the cognitive processing strategies used by a sample population of children attending resource room programs for the remediation of reading difficulties. Brailsford (1981) found that children instructed in the task-appropriate utilization of cognitive processing strategies on non-print activities, showed gains in reading comprehension performance subsequent to fifteen hours of strategy training. The control group, whose remedial program had focused on reading comprehension activities throughout the same time allocation, also showed gains in reading comprehension performance. However, the experimental gain was significantly higher than that obtained by the control group. If training in the appropriate engagement of cognitive processing strategies within a generalized, non-print framework transfers to enhance performance in reading comprehension, the researcher may hypothesize that similar results might be obtained with regards to performance in listening comprehension. A program of strategy training, embedded within a generalized information processing framework, could be a viable alternative to the approaches currently used for the remediation of receptive language comprehension difficulties, for some children.

Limitations of the Study

Consideration of the findings of this study should take into account an awareness of the following limitations:

1. Since the sample is drawn from a fourth grade population of able and less able readers, the findings should be limited to similar populations.
2. Overuse of the Gates-MacGinitie Reading Test (1978) in some schools may result in over-inflated performances in reading comprehension due to the practice effect, for some of the sample population. Selection of an alternate, less widely used screening device may more closely ensure a truly representative sample prior to data collection.
3. There is, as yet, no known method of gaining direct access to the cognitive processes engaged during receptive language comprehension. Passage recall, in conjunction with semantic analysis, provides the researcher with some insight regarding the organizational and reasoning abilities of the processor. The insight gained, therefore, lies within the limitations of the method of investigation.
4. Verbal fluency is not accounted for. It is possible that children somewhat lacking in verbal fluency are inhibited when asked to orally recall comprehended passage information, and may not express their thoughts succinctly.
5. The Standard Reading Inventory (McCracken, 1966) provides passages from the pre-primer to grade seven

level. A competent fourth grader may not reach frustration level on listening to, or reading, the final passage provided in the test. Hypothetically, therefore, the child's final instructional comprehension level will not have been established. However, there is evidence to suggest that unaided recalls within an instructional range contain equivalent qualitative data (Kavanagh, 1981).

Assumptions

1. It is assumed that Fagan's Comprehension categories for protocol analysis (Fagan, in press) provide adequate access to the cognitive processes engaged during tasks of reading and listening comprehension.
2. It is assumed that a child's <u>total</u> recall of passage information, i.e. his unaided recall score plus that for his responses to additional questioning, includes all of the information comprehended. According to Lindfors (1980) "Children express the 'semantic intentions' or meanings of which they are capable, those which they understand" (p. 179).

CHAPTER II

THEORETICAL FRAMEWORK AND RELATED LITERATURE

Introduction

The present study investigates whether fourth grade children use similar cognitive processing strategies when engaged in tasks of reading and listening comprehension, and whether able and less able readers process the input from both tasks in a similar manner, when the information being processed is presented at individual instructional levels of receptive language comprehension. In broad terms the researcher is examining the processing of relatively complex information within a specific and formal framework. The fact that children are able to process such information effectively, within the conditions established for the current research treatments, rests upon the accumulative and diverse information processing accomplished by each child throughout his nine or ten years of life to the present time. During his lifespan the child has actively engaged in cognitive and linguistic processing in order to comprehend his enlarging world. The interdependent relationship of cognition and language is implicit in the recall protocols collected as raw data for analysis of reading and listening comprehension processing in the present study. As such, this relationship may be viewed as a foundation from which

and through which an investigation of the child as an information processor may proceed.

Cognition and Language: The Corner-Stones of Comprehension

Cognition and language form an interdependent relationship when considered within the framework of the child as an information processor, given the basic premise that the child is physiologically and psychologically healthy. Certainly the child may think without verbalizing his thoughts and, conversely, speak without having thought about what he is saying but:

> The relation between thought and word is a living process; thought is born through words. A word devoid of thought is a dead thing, and a thought unembodied in words remains a shadow. (Vygotsky, 1962, p. 153)

A child is a social being. He learns to verbalize his thoughts as he attempts to organize incoming information in a manner which sustains, modifies, or enlarges his current understanding of himself in relation to those dimensions of the world with which he interacts. In Piagetian terms (1977) he assimilates and accommodates incoming information in an ongoing attempt to maintain equilibrium. In the process, his "theory of the world" (Smith, 1971) expands in breadth and depth as he transmits and receives information in a highly interactive manner.

One of the child's central tenets is to make sense of the world in which he lives and the extent to which he is able to do so depends largely upon his ability to comprehend spoken and written language, in the final analysis.

Cognition and language become so closely interwoven that, in the maturing information processor, cognitive ability is reflected in linguistic prowess and vice versa. As this study is concerned with "making sense", i.e. the comprehension of written and narrated discourse, the child's conceptual development as reflected in the semantic aspects of language will be expanded in the following sections. A brief overview of language development will illustrate the growth of semantic complexity from early childhood to the mid-elementary aged child addressed in this study.

Semantic Aspects of Cognition and Emergent Language

The young child engages in intense cognitive activity and is party to numerous receptive and expressive language encounters before the "... crucial instant, when speech begins to serve intellect, and thoughts begin to be spoken ..." (Vygotsky, 1962, p. 43). Until that instant arrives cognition and language appear as parallel entities, their juxtaposition being observed through interpretation of the child's initial experimentation with the sounds of language. When both areas merge, however, they form a strong inter-dependent relationship. Reporting Sloban's research on language acquisition spanning more than forty different languages, Lindfors (1980) concludes:

> ... children (universally, it appears) go about the task of language acquisition using similar mental processing schemes ... Are these operating principles cognitive strategies or linguistic strategies? Of course they are both: cognitive strategies employed in the acquisition of a language system. (Lindfors, 1980, p. 179)

The interdependent relationship between cognition and language becomes immutable. Halliday (1975) proposes that the child's early language development stems from his attempts to construct a conceptual framework encompassing all that he feels, hears, sees and does within his relatively limited sphere of existence:

> The child is learning to be and to do, to act and interact in meaningful ways. He is learning a system of meaningful behaviour ... Part of his meaningful action is linguistic ... none of it takes place in isolation; it is always within some social context. (Halliday, 1975, p. 15)

Halliday describes the child's increasingly meaningful behaviour in terms of linguistic and socio-functional systems, and states that cognitive processes initiate the interpretation of social interaction which results in verbalization.

Hence the child engages cognitive and linguistic processes in order to make sense of his world. His rapidly expanding and organized representation of that world forms the foundation from which he will continue to interact, "... building hypotheses about language, gathering further data, testing hypotheses, and refining them as he goes" (Lindfors, 1980, p. 111). Clearly his hypotheses are not concerned solely with language itself. He reflects upon the unravelling intricacies of language, and uses language to reflect upon and shape his understanding of every animate and inanimate presence with which he makes contact. The corner-stones of comprehension - cognitively based language and linguistically verbalized cognition - are engaged both consciously and subconsciously as he progresses from infancy

through pre-school years, learning a great deal about his place in the world with minimal "formal" instruction.

The child as an information processor progresses far beyond the surface structure of the data with which he interacts. In terms of linguistic knowledge "... he deduces ... an underlying set of organizational principles and sound-meaning relationships" (Lindfors, 1980, p. 95), demonstrating his ability to generate semantically acceptable sentences which do not replicate sentences spoken within his hearing; in other words he "cracks" the highly complex linguistic coding system in a manner which would ensure international acclaim - if he was the anthropologist who finally "cracked" the mystery of the elusive "Missing Link". The child's feat is of similar magnitude, but of no specific import because it is an expected facet of the normal developmental process. In terms of his interactions with people the child learns to "read" the meanings underlying diverse facial expressions - joy, anger, satisfaction, surprise - without recourse to verbal confirmation; he begins to ask and respond to questions in a manner that extends well beyond the concrete reality of the situations in which they arise. He is, in summary, enlarging his capacity to engage appropriate cognitive processes in order to extend his comprehension of the world that surrounds him; processes which indicate clearly the strategic employment of cognition and language harnessed in their interdependent relationship as the corner-stones of comprehension.

Cognitive Processing and Comprehension:

The Spider's Web of Relationships

> ... consciousness is relational ... it keeps relating new meanings ... to old meanings ... [it] is like a spider's web and you are the spider in the centre. The centre of the web is the present moment. But the meaning of your life depends on those fine threads which stretch away to other times, other places, and the vibrations that come to you along the web. (Wilson, 1974, p. 75)

The child forms relational theories about the nature of the world around him long before his formal schooling begins. Those theories are, of necessity, tentative for the child's conceptualizations change as he continues to process incoming information. He attempts to relate new concepts to those already internalized (Pearson and Johnson, 1978). If a new concept has no referents in his existing cognitive schema, the concept is accommodated as potentially relevant information and lies dormant in an appropriate placeholder (Anderson, 1977), either awaiting further embellishment or fading from short-term memory when no additional, relational data become available. The child's understanding of the world, his spider's web of relationships, gains in breadth as he processes surface information and depth as he processes underlying meaning, relating new theories to old as comprehended information vibrates the web's fine threads.

The child's comprehended horizons thus expand. New knowledge becomes old knowledge and the child as an information processor develops scripts (Schank, 1973), which represent:

> ... all the mundane, taken-for-granted knowledge that an information processor ... brings to a real-life situation (reading or listening about ... [that situation]...). (Pearson and Johnson, 1978, p. 45)

Appropriating Anderson's (1977) restaurant theme, when the child visits a restaurant or reads/listens to a story about such a visit his "taken-for-granted" prior knowledge - his restaurant script - is activated. Consciously or sub-consciously he is aware of certain "going to a restaurant" expectations, i.e. one enters the restaurant, is seated, orders, eats, pays the check and leaves. Should the actual or vicarious (sharing with author or narrator) visit be infused with some phenomena outside the child's prior knowledge, e.g. the would-be diner being asked to leave his shoes at the door and to use his fingers and chopsticks instead of the expected knife and fork, the child's restaurant script gains new dimensions. The child's diverse array of scripts, e.g. going to the dentist, receiving a present, 'cycling on an errand, getting ready for a bedtime story, are the products of his interaction with the world. He has perceived, processed, and understood the relationships which constitute the current parameters of his scripts. He has actively engaged cognitive processes, and continues to do so, to organize the pieces of his world's jigsaw into the ever-changing but largely comprehensible boundaries of his life. Scripts, having been compiled and internalized, free the child from the necessity of focusing total attention on every facet of information being processed. He can focus upon the new and accept the old as a given (Henry, 1974).

Thus, on first entering school the child's mind is not an empty slate waiting to be filled with knowledge. The tabula rasa metaphor (Bronowski and Mazlish, 1960) belies the view of the child as the past, present and future dynamic information processor addressed throughout the pages of this study. Certainly there are times when the child does not achieve a match between his prior knowledge and the incoming information, but his interactive cognitive processing continues regardless. Hence the child enters school bringing with him world-information he has encountered, processed and understood to date. He is the sum of all his experiences. He is at the centre of his spider's web of interrelationships which represent his understanding within the context of his world. He has processed information both simple and complex. He has processed automatically (e.g. information which "fits" his scripts), with appropriate reasoning (e.g. some Oriental restaurants promote fingers and chopsticks as being effective utensils), and with strategic planning (e.g. he will ask for a fortune cookie when he revisits the Jade Dragon; he wonders where his fortunes lie). The spider's web expands to encompass a school schema with its diverse sub-schemas. The child begins a new phase in his life in terms of the nature of the information to be processed and the relatively formal environment which will absorb much of his attention during the ensuing ten to twelve years.

Evolving Semantic Complexity

The grade four child is a complex being. Throughout the previous three years he has learned, amongst other factors, to read and write with a level of proficiency that may be less than, equal to, or in advance of that achieved by his peers. However, qualitative and quantitative aspects aside, the fourth grader's developing understanding of the interwoven relationships within and between concepts is far more sophisticated and defined than when he was for example two or seven years old. His expanded "theory of the world":

> ... grows and changes as [he] encounter[s] others' experiences, interpretations, and ideas. This encounter most often happens through language interaction, whatever the expressive channel: talking and listening, reading and writing. (Lindfors, 1980, p. 246)

Since this study examines instructional level receptive language comprehension, hence bypassing the necessity to attend to factors outside that level (e.g. the why's and wherefore's of a fourth grader's grade two instructional reading comprehension level, hence his frustration level comprehension of materials written at the grade four level), the researcher may move directly from the generalized "child's world" comprehension to the specific comprehension of written and narrated discourse. The child brings the wealth of his cognitive, linguistic, and world knowledge to bear in his interactive processing of written and narrated discourse. Assuming that he can decipher "the marks on the paper" (Holdaway, 1979, p. 153) as he reads, it is the meaning of the message with which he interacts, and it is

his understanding of that meaning - his shared communication with the author - that is a major focus in the present study.

When processing written or narrated discourse the child has certain expectations regarding the nature of the incoming information. Within his world knowledge lies his knowledge of the ideal story schema which is "tested and modified ..." (Cronin, 1980, p. 1) each time he reads or listens to a new story:

> People construct story schemata from two sources. One source comes from listening to [and reading] many stories and consists of knowledge about the sequencing of events in stories ... The other source comes from experience and includes knowledge about causal relations and various kinds of action sequences. (Mandler and Johnson, 1977, p. 112)

The information processed from these two sources merges within the interrelated threads of the "spider's web". Although the sources and modes of input differ the cognitive processes engaged remain intrinsically the same within the superordinate concept that "whatever influences general thinking or problem-solving ability also influences reading (and listening) comprehension" (Pearson and Johnson, 1978, p. 9). Thus, as the child reads or listens to the author's message cognitive processes are activated by the linguistic input which is, by its very nature, symbolic:

> ... Language is a manifestation of symbolism which may be represented in oral or visual form. Because both languages may be based on a common symbolism, there necessarily exists a relationship [which] may best be reflected at a level of meaning. (Fagan, 1978, p. 22)

Linguistic facility enables the child to organize his thoughts as he reconstructs the meaning of the message,

drawing on all of his knowledge bases to do so (Berger and Perfetti, 1977; Holdaway, 1979; Smith, 1971; Sticht, 1972; Walker, 1973). Meaning evolves as he processes each successive sentence, whilst interacting simultaneously with the deep structure created by the relationally interdependent combined sentences of the message in its entirety. He comprehends the flow of language only to the extent that he is able to process the complex, deep-structural referential system embedded within the message; its framework and interwoven relationships (Fagan, 1978, p. 33). The child's elicited retrieval and verbal recall of the information processed may, within the parameters of an information processing model, provide access to the covert cognitive processing strategies that he engages during specific tasks of reading and listening comprehension. Figure 1 indicates the interaction common to both tasks.

Accessing Cognitive Processes

> To study an internal process it is necessary to externalize it experimentally, by connecting it with some outer activity; only then is objective functional analysis possible. (Vygotsky, 1962, p. 132)

One method of attempting to externalize internal processes consists of eliciting the child's verbal recall of passage information following task completion. The child is asked to retell passage details in his own words, the request being based on the assumption that the recall reflects the nature of the child's coding, integration, and organization of incoming information (Berger and Perfetti,

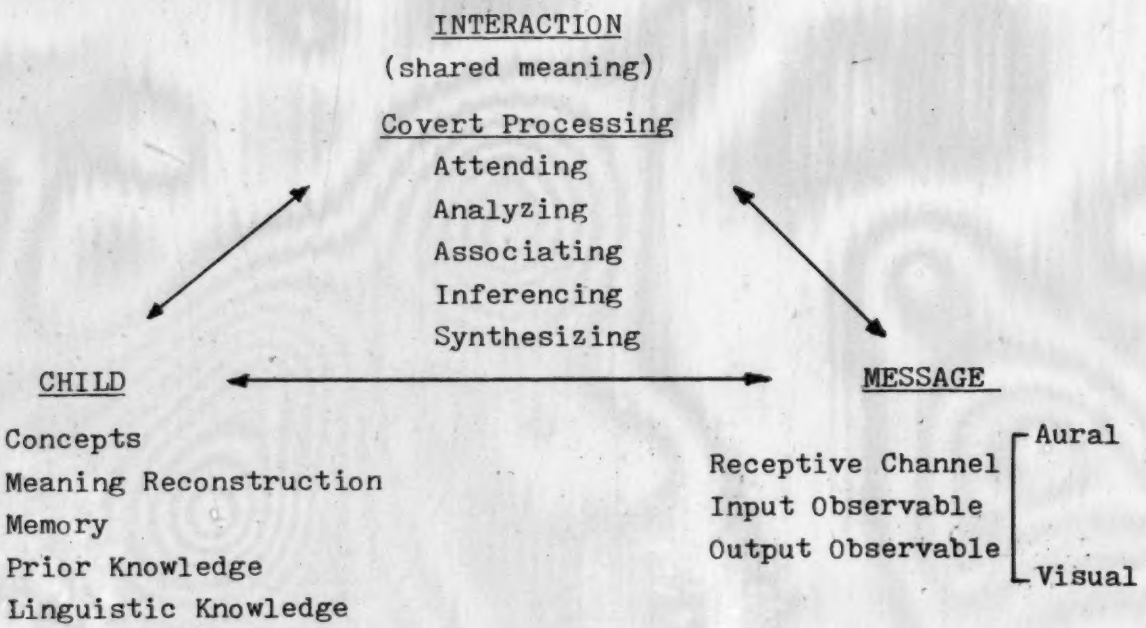


Figure 1

Common Interaction in Reading and Listening Comprehension

1977, p. 8). The raw data contained in a verbal recall represents Vygotsky's (1962) "outer activity" through which the child's internal processing may be examined within the parameters of an information processing model.

Drum and Lantaff (1977) devised and operationalized a model consisting of five categories of comprehension used in the interpretation of recall protocols. Purporting to be indicative of the different types of text information recalled, the categories are labelled text specific, text entailed, text elicited, text evoked, and text external. Drum and Lantaff's (1977) model provided the base from which Fagan's Comprehension categories for protocol analysis evolved (Fagan, in press), the latter being used for the interpretation of raw data in the present study. Fagan's categories were adapted and modified as he undertook theoretical and practical research (Fagan, 1978, 1980) and were further refined and clarified during more recent studies (Beebe, Fagan, and Malicky, 1981; Brake, 1981). The categories isolate the various types of information recalled under the headings of text exact, text specific, text entailed, text experiential, and text erroneous; they provide the vehicle which makes "objective functional analysis possible" (Vygotsky, 1962). Fagan's categories form a framework within which the researcher may gain insight into the cognitive processing strategies engaged by the child during tasks of receptive language comprehension.

Fagan's Comprehension categories, when assigned to information units within a recall protocol, reflect both the

textual information processed and the ways in which that information is processed:

A. Text Exact: text information either recalled verbatim or with minimal variations.

B. Text Specific: information that has specific textual references, and that has been transformed from reordered or substituted lexical items.

C. Text Entailed: retrieved information which contains (1) paraphrased items synonymous with the input, and derived from more than a single unit of text, or (2) a subordinate statement subsuming more than one unit of text information.

D. Text Experiential: the processor's additions which fill "gaps" in the text data.

E. Text Erroneous: inaccurately processed information. (Fagan and Currie, 1981, p. 4)

Once it becomes clear what textual information has been processed, the researcher may make inferences concerning how the information has been processed. Acknowledging that the reader and listener may use discrete strategies, or combined, depending upon the text content and degree of difficulty experienced, the cognitive processing strategies engaged may include those of (1) attending, (2) analyzing, (3) associating, (4) inferring, and (5) synthesizing. The first three processes noted above are reflected by each of Fagan's categories. The text specific category may include synthesis at the sentence level, whereas the text entailed category may include synthesis within and across sentences.

The text experiential category includes inferencing which may be textually constrained or non-specifically related to the central theme. All of the processes, except perhaps attending, may be implicated in the inaccurate processing reflected by the assignment of the text erroneous category.

The central tenet of the current study is that when readers and listeners process information which matches their individual instructional receptive language comprehension levels, then able and less able readers exhibit the engagement of similar cognitive processing strategies. According to Malicky (1982), once categories have been assigned to information units, e.g. clausal units within a recall protocol, the researcher may "draw process implications"; "implications" because no one can state absolutely what processes the child engages whilst interacting with the input.

Processes Accessed by Comprehension Categories

In her recently compiled clinical handbook, A Reading Processes Approach to Diagnosis and Remediation, Malicky (1982) describes the cognitive processes which a child may engage during tasks of reading comprehension. Since the present study hypothesizes that comprehension of written or narrated discourse entails the engagement of similar underlying thought processes, regardless of the receptive channel employed, Malicky's discussion may be applied to both reading and listening comprehension data.

When addressing the process of attending, Malicky

proposes that "the primary source of such data involves observation of the [information processor] during silent reading" (p. 74). Examination of the child's recall protocol further confirms which units of information his attention focuses upon and, thus, whether he views reading as a word identification task by recalling isolated words and discrete fragments, or as a task of reconstructing meaning from print (p. 75) as evidenced by appropriate synthesis of two or more units of information. Malicky observes that the analyzing, or abstraction of textual information, process is a necessary prerequisite for subsequent synthesis and inferencing. The child who analyzes information for retrieval and recall of only verbatim or paraphrased information may be viewed as a relatively passive processor who processes surface structure and does not explore the underlying, deep-structural relationships. He is "often unaware of the importance of using his background knowledge as he reads, and often has difficulty answering inferential questions as well" (Malicky, p. 75). This child is at the centre of a "spider's web" whose fine threads may be intact from the centre to the perimeter; threads which, as yet, remain disconnected because the relational, linking threads have not been woven. However, whenever attending and analyzing processes are evidenced in a recall protocol, it is assumed that the child has made meaning associations also. Whilst recalled information may indicate that verbatim data has been verbalized in rote fashion, Malicky notes that there is reason to suppose that the child has indeed been associating

meaning since "rote memory for unrelated items is very limited" (p. 76).

The most vital process inherent in the "spider's web of comprehension" is that of synthesizing incoming information from separate units of text. Only by determining the underlying relationships which link ideas within and across sentences can the child fully comprehend the author's message, or at least as much of the message as possible without further discourse with the absent author. If the child can recall the gist of the message then he has reconstructed the author's meaning appropriately. He has combined background knowledge, knowledge of language and story schema, and appropriate cognitive processing strategies in a dynamically interactive manner; the "whole child" has engaged in an act of shared communication. If appropriate inferencing is evidenced in the child's recall he has clearly understood the author's meaning and added salient details culled from his own prior knowledge; should the inferencing be inappropriate it is likely that a mis-match has occurred, either at the word level or at the level of inter- and/or intra-sentential relationships. According to Malicky, the engaging of appropriate synthesizing and inferencing cognitive processes combines the "necessary components of effective comprehension" (p.77). Thus, the cognitive processes engaged during specific tasks of reading and listening comprehension, when reflected in Fagan's Comprehension categories for protocol analysis (Fagan, in press), may be accessed for inferential interpretation and

subsequent analysis. The categories are described in detail in the following chapter, and in their entirety in Appendix C.

An Overview of Reading and Listening

> "I read you loud and clear." In English these words have come to mean that a listener has clearly heard and understood a spoken message. "Reading" in this sense means "understanding", and rests on the long-standing assumption that reading and listening are analogous forms of receptive communication. (Tuman, 1980, p. 698)

Some researchers have accepted the assumption noted above, others have not. The "jury is out" but not behind closed doors. The debate continues unabated as the pros and cons regarding whether or not "reading and listening are (indeed) analogous forms of receptive communication" are researched and discussed. A review of the literature reveals that the over-riding question has been approached from many different perspectives and via diverse treatments and methodologies. It is incumbent upon the writer, therefore, to delineate the paths taken by past researchers and to ensure that the threads which emerge for the purpose of this study focus upon appropriately selected comparisons, e.g. the underlying thought processes which are crucial in achieving effective reading and listening comprehension may be abstracted for comparative observation just as the intrinsic qualities that depict "dog" may be examined in a side-by-side observation of a terrier and a retriever, i.e. reading and listening comprehension resulting from the superordinate thought processes; terrier and retriever stemming from the superordinate genus "dog".

Reading and Listening: The Same Channel, Different Modes

Clearly differences exist between the receptive language channel's reading and listening modalities. The graphic input processed during reading offers a dimension not available in the auditory input processed during listening; the symbolic features of print. The act of reading is spatial in that the reader may regress, repeat, look ahead, and monitor for meaning as he processes; the act of listening is temporal in that the listener must react simultaneously to the sequential flow of language as the narrative unfolds. Additional diversifying features apparent when comparing the act of reading and the act of listening include the following details:

> Spoken language has ... the use of stress, intonation, and other prosodic features. Temporal characteristics of speech such as pauses and changes in speed often provide clues for the chunking of words into larger constituents ... [However] ... Text does have some compensatory aspects ... it frequently indicates illocutionary force (.?!), pauses (;), lists (.:;), and related statements (;) ... segmentation of the message into words and sentences is concretely indicated ... The demarcation of paragraphs is ... an organizational aid ... Textual devices such as underlining and italicizing may be used to emphasize or contrast words and phrases. (Rubin, 1978, pp. 6-8)

In a more general sense, directly applicable to school instruction, the teaching of reading is widespread whilst such is not the case with listening; however, the fourth grade child has participated in far more listening than reading activities throughout his lifetime. Modalities and emphases differ, the channel is common to both.

There is evidence to suggest that at least one modality difference affects achievement level performances in reading and listening comprehension during the early elementary years. Sticht et al (1974) present a developmental model of auding and reading within which the fourth grade is viewed as the pivotal year during which students may or may not have mastered the decoding variable in reading. Surveying comparative research studies spanning the years 1917 to 1970, where identical or matched group fourth graders were presented with identical or equivalent reading and listening passages, Sticht et al (1974) identified nine out of eleven studies which indicated higher achievement levels in listening comprehension than in reading comprehension (pp. 76, 77). The decoding variable inherent in the processing of print, which has no direct counterpart within the listening framework, seems to be the decisive factor most heavily implicated in discussion of the findings noted above.

Circumnavigating the Differences for Protocol Analysis

Whilst modality differences warrant concern when comparative achievement levels are being observed, they are not insurmountable in terms of the analysis of processing strategies. A methodological variable is available which allows the researcher to circumnavigate differences, i.e. the variable of collecting instructional comprehension level raw data. Since an instructional level per se indicates the level at which a child may process and comprehend written (Brake, 1981; Clarke, 1981; Schienbein, 1978) and thus

narrated discourse effectively, it may be assumed that mode of input factors have presented minimal or zero interference at that level. Hence, content analysis of recall protocols resulting from instructional level processing of written and narrated discourse should provide reliable information regarding the cognitive processing strategies engaged, irrespective of modality.

Comparative Research: Reading and Listening Overview

Researchers concur that similarities and differences exist between the receptive language modalities. However, the rumblings of a potential "great debate" are becoming pervasive amongst comparative theorists. Researchers tend to align behind one of the two most compelling theories expounded at the present time. One school of thought proposes that the similarities between reading and listening far outweigh the differences; that underlying and combined mental and linguistic processes form the common base from which reliable comparisons may be addressed (e.g. Sticht et al, 1974). Smith's proposal (1982), that the brain assumes central control over purposeful sensory processing, lends support to the common base theory. Alternate school of thought proponents argue that modality differences can not be negated; that the child must actively set aside much that he has learned about receptive language comprehension by listening before he can assimilate alternate procedures necessary for learning to read. Furthermore, they state that it is overly simplistic to accept the developmental

viewpoint that learning via the eyes (reading) is a natural extension of learning via the ears (listening). The alternate theorists (e.g. Rubin, 1978) do not accept the developmentalists' "building blocks" formula.

Theoretical differences of opinion are not reconciled easily. In fact they are compounded due to lack of agreement regarding which specific aspects of reading and listening best answer the question as to whether or not correlations exist. Sticht et al (1974) find definite correlations when examining comparisons between the comprehension of written and spoken prose. Rubin (1978) accepts their findings in this regard, but cautions that correlations found in relation to prose passages can not be viewed as global answers for all reading and listening situations, i.e. that listening to a conversation can not be compared with listening to prose, hence research findings on the latter may not be applicable with the former. The issue seems to be clouded unnecessarily since Sticht et al (1974) do not claim findings of global relevance. Indeed, the fact that an "issue" has arisen at all may be due to comparisons having:

> ... mainly been made between the comprehension of spoken and written prose, a fact which may have served to emphasize the similarities rather than the differences between reading and listening. (Walker, 1975/76, p. 149)

A year later, Walker places the "issue" squarely where it rests most comfortably - as a non-issue - in terms of his latest study comparing the comprehension of writing and spontaneous speech:

> The findings of the present study do not deny the Sticht model (1974); they merely suggest one way in which the processes underlying language comprehension may function differently with respect to reading when the comparison is made with listening to spontaneous speech [as opposed to listening to narrated prose]. (Walker, 1977, p. 47)

Leaving the embryonic issue as a non-issue, then, pertinent factors remain to be discussed regarding the methodologies and treatments used in research studies during the past sixty-five years.

Testing Criteria: Format and Comparison

Intent upon ensuring that comparative research studies adhere to well-defined controls Durrell (1969) proposes as vital the equivalence of testing materials and identical test format and directions, mode of response, and time duration. The latter poses some problems. Standardization of the time factor creates an artificial atmosphere in as much as, "... the normal rate of reading is commonly 2-3 times as that of speech" (Rubin, 1978, p. 36). Compressed speech, whilst ensuring an identical rate of input to a controlled reading situation, may be viewed as non-representative within the normally expected listening framework. Equally non-representative is the presentation of print segments on a screen, the one being removed before the next is visible, to ensure that the reading situation more closely resembles the listening situation where neither regression nor looking ahead are possible (Rubin, 1978).

Danks and Pezdek (1980) share the concerns noted above

and, when examining Sticht et al's (1974) survey of reading and listening research, refute the inclusion of "many experiments, each of which is flawed" (p. 24), opting rather for the examination of a single, well-executed study whose conclusions are grounded in reliable methodology. A study undertaken by Kintsch and Kozminsky (1977) may serve to illustrate what could be termed "flawed" research, depending upon the stance of the reviewer. College students were required to either listen to or read three stories. Subsequent to attending to the input they were asked to provide concise summaries of each story. The students were encouraged to edit and revise their output until satisfied with the end products. An anomaly arises in that the group of readers had continuous access to the original stories throughout the summarization tasks; access that was not replicated for the group of listeners (p. 494). Whilst the readers' summaries were textually constrained and concise those of the listening group, although retaining the gist of the original stories, contained unique and irrelevant statements. Undoubtedly the presence or absence of stories' accessibility during task completion contributed to inter-group differences. The researchers provide no explanation for the differing condition. Whilst it may be argued that readers have constant access to print during normal circumstances whereas listeners do not, the instance cited above seems excessive within a comparative research study.

Lack of consistency in testing criteria and methodology has resulted in relatively discrete findings, a factor which

impedes the compiling of a solid body of related data for comparative research purposes. Within the spider's web analogy, many fine threads are formed but the linking strands are not yet intact. Only one link has been firmly established to date, i.e. at the elementary school level, achievement in listening comprehension tends to exceed achievement in reading comprehension, until the decoding variable in reading has been surmounted. Hence, the "learning potential" theory arises.

Listening Prowess Equals Reading Potential?

As might be expected, the developmental theorists are the most avid proponents of the hypothesis that a child's achievement level on tasks of listening comprehension is indicative of the level he will come to achieve in reading comprehension once automaticity in deciphering print is assured. The hypothesis rests on the assumption that reading and listening share a common thinking/languaging base in terms of what the child brings to a receptive language task and the nature of the interactive information processing that ensues (Lewis, 1952; Lundsteen, 1979; Sticht et al, 1974). Indeed, research findings support:

> ... an increase in the relationship between auding and reading test performances as school grade increases, and ... children acquire reading decoding skills for using print to develop meaning previously available only by auding. (Sticht et al, 1974, p. 90)

On collating the results of research studies, some concerned with word level comprehension and some with the comprehension

of prose, Sticht et al (1974) report that listening ability tends to exceed reading ability during the first three grades, tends to equalize between grades seven and eight, and that reading ability may forge ahead during early adulthood (pp. 82-84). In studies whose samples include able and less able readers at the elementary school level (Berger and Perfetti, 1977; Many, 1965) the findings suggest that:

> ... less skilled readers recall the same information [following listening and reading tasks] that skilled readers do; they simply recall less. (Berger and Perfetti, 1977, p. 14)

In both of the studies cited above the less able readers were attempting to process print presented at frustration level, hence the decoding variable would detract from comprehension. However, since Berger and Perfetti (1977) note that the able readers' performance on both tasks exceeded that of the less able readers "by equal amounts" (p. 7) a general language comprehension factor emerges; decoding becomes a related but secondary issue.

The reading "potential" theorists do not dispute the evidence pointing towards the notion that general language processing ability underpins a child's performance on tasks of receptive language comprehension. The language factor, within its interdependent relationship with cognition, lends credence to the "potential" stance. As the child's facility with expressive and receptive language increases, some improvement in reading and listening comprehension performances might be expected. Moreover, once a comfortable

level of reading automaticity is reached

> ... the two receptive processes of reading and listening should be mutually supportive. The understanding of a component in one can enhance the development in the other. (Lundsteen, 1979, p. 3)

Embedded within the ramifications of the "potential" theory, cognition and language re-emerge as the corner-stones of comprehension.

The General Language Comprehension Factor

The general language comprehension theorists hypothesize that less able readers, when processing tasks of both listening and reading comprehension, exhibit a "general language comprehension deficit" which is not reflected in the processing accomplished by able readers. It is suggested, however, that the "deficit" exists relative only to the nature of the materials processed, i.e. if fourth grade able readers were asked to read or listen to materials written for grade seven consumption, it is highly likely that many of the children would exhibit a "language comprehension deficit"; within this hypothetical framework the "deficit" children would warrant the "less able" classification. Researchers and teachers alike do not expect children to process input competently when that input exceeds grade placement requirements. Indeed, such a situation would be ludicrous. Hence, the able/less able descriptors are used to discriminate a child's processing efficiency in terms of the grade level in which he is placed currently. Researchers have attempted to ensure that the processed input either,

(a) matches the grade placement level of the children being studied or, (b) matches an intermediate level in terms of the whole group, i.e. if screening tests indicate that the mean achievement level of the able processors is 5.5 and that of the less able processors is 2.5, then the input presented conforms to the intermediate 4.0 level of complexity as measured by a readability formula. In both instances it is reasonable to assume that many of the less able group members are being required to process at frustration level. If such is the case, findings indicating a general language comprehension deficit amongst less able processors create no surprise.

Berger and Perfetti (1977) examined the processing of intermediate level descriptive passages read or heard by fifth graders. Matched according to I.Q., chronological age, and sex, the mean reading comprehension grade levels from a standardized screening test were 5.05 for the able group and 2.62 for the less able group. Students were required to provide a free recall followed by the answering of ten literal comprehension questions subsequent to processing the input:

> Performance of the skilled readers exceeded that of less-skilled readers by equal amounts for reading and listening and by equal amounts for paraphrase recall and literal question answering. (Berger and Perfetti, 1977, p. 7)

Hence, the researchers proposed that the same general language processing skills were common to both reading and listening comprehension task requirements and that less-skilled readers "... generally have a reduced ability to

comprehend language ..." (p. 13). A seventh grade study undertaken by Smiley et al (1977), adhering to similar internal controls, produced the same conclusions. Other research studies, spanning varied grade and age ranges and using diverse methodologies, present findings which point towards a general language comprehension deficit in less able readers when the latter process grade placement or intermediate levels of input (Berger, 1975; Sticht, 1972; Sticht et al, 1974; Weisberg, 1979). Juxtaposed with the emerging deficit factor, the cognitive processes engaged by able and less able prose processors whilst reading and listening appear to be highly similar (Devine, 1978; Lundsteen, 1979; Rubin, 1978).

Whilst a review of the literature has failed to reveal comparative reading/listening studies which examine how able and less able readers process instructional level input, some recent studies in the area of reading comprehension have done so (Brake, 1981; Clarke, 1981; Kavanagh, 1981; Schienbein, 1978). All of the researchers report similar processing of instructional level materials by both able and less able groups. If the cognitive processes engaged during reading and listening comprehension tasks are similar, it may be supposed that the reading research findings will be reflected within a listening context when the input is presented at instructional levels.

Summary

> Listeners or readers do not have the meanings poured into them - they are not conducted to them directly through the sounds in the air or from the marks on the paper; they make them from what is linguistically given in relationship to all that constitutes their own self-awareness. Thus, the interpretation of language is a creative process.
> (Holdaway, 1979, p. 153)

Information processing is the complex and creative procedure in which the fourth grade child has participated actively throughout his nine or ten years of life. He has engaged cognitive and linguistic processes, harnessed in their interdependent relationship, in his attempts to make sense of the world and of his own standing within the world context. Over the years his accumulating world, linguistic, and self-knowledge reflects his understanding of increasingly complex relationships. The child brings his diverse wealth of understanding to bear as he processes instructional level tasks of reading and listening comprehension in a highly interactive manner. The present study hypothesizes that similar cognitive processes are engaged for both receptive language comprehension tasks, when the input is written or narrated prose, and that the similar processes are common to both able and less able readers during the processing of instructional level input.

CHAPTER III

THE EXPERIMENTAL DESIGN

Selection of the Sample

The purpose of the study was twofold. Firstly, the study was designed to ascertain whether grade four students employed similar processing strategies when engaged in tasks of reading and listening comprehension. Secondly, the research focused on whether able and less able fourth grade readers used similar processing strategies when processing tasks presented at each student's individual instructional level.

Fourth grade students attending four schools in the County of Parkland No. 31 constituted the population from which the sample was selected. The two hundred and ten students lived in dormer towns, or on acreages or farms within a thirty-five kilometers' radius of the city of Edmonton, Alberta.

The comprehension subtest of the Gates-MacGinitie Reading Test, Level D, Form 2 (1978) and the non-verbal section of the Canadian Cognitive Abilities Test, Level B, Form 1 (1974) were administered to the grade four population by the researcher. All students with reading performance scores at or above the seventy-third percentile, and with a non-verbal I.Q. score of eighty-five or above, were potential

subjects for the group of able readers. All students with reading performance scores at or below the thirty-fourth percentile, and with a non-verbal I.Q. score of eighty-five or above, were potential subjects for the group of less able readers. Four exclusion factors were then applied. Children with clinically identified hearing or visual impairments, who could not function without specialized instruction in the regular classroom setting, were eliminated from the study. Children who lacked verbal fluency because English was their recently acquired second language were excluded, as were children whose clinically identified behavioural problems were recognized as a major factor inhibiting regular academic progress. Finally, children who had repeated a grade were excluded on the premise that their additional year of world knowledge could result, conceivably, in the processing of written or spoken discourse in a manner non-representative of children for whom fourth grade placement signified their fourth year in school.

From the initial population of two hundred and ten children, one hundred and eight were ineligible due to the criteria noted above, as detailed in Appendix A. One hundred and two children remained eligible for inclusion in the sample. From those eligible, ten boys and ten girls were selected to form the group of able readers by means of a table of random numbers. Similarly, a random sample of ten boys and ten girls was selected to form the group of less able readers. Hence a total of forty children participated in the study. Table Three indicates sex, percentile ranks

Table Three

Profile of the Group of Able Readers

Subject	Sex	Comprehension Percentile Ranks	Non-Verbal I.Q. Scores	Chronological Age (Months)
01	F	76	115	116
02	F	96	108	112
03	F	73	120	118
04	F	90	127	114
05	F	79	107	113
06	F	96	99	119
07	F	84	108	118
08	F	84	108	111
09	F	98	114	115
10	F	95	107	108
N = 10 girls				
11	M	96	115	117
12	M	90	130	108
13	M	84	111	111
14	M	92	117	116
15	M	86	113	119
16	M	73	95	118
17	M	79	94	113
18	M	73	86	112
19	M	73	121	111
20	M	90	100	110
N = 10 boys				

Total = 20 children (10 girls and 10 boys)

on the comprehension subtest of the Gates-MacGinitie Reading Test, Level D, Form 2 (1978), the non-verbal I.Q. scores on the Canadian Cognitive Abilities Test, Level B, Form 1 (1974), and chronological ages, for the group of able readers. Table Four provides the same profile for the group of less able readers. T-tests for independent samples were calculated to obtain measures of the groups' equivalence in percentile ranks on the reading comprehension test, I.Q., and age. Means, standard deviations and t-ratios are presented in Table Five. No significant difference existed between groups on the variable of age. As expected, there was a significant statistical difference between the groups' performance on the test of reading comprehension. Although there was a significant between-groups' difference at the .05 level on the non-verbal I.Q. variable, groups' means placed within the average range of intellectual functioning.

It should be noted that a test of listening comprehension was not included in the screening battery, since the intention was to control one variable, i.e. reading, and to view the unbound variable, i.e. listening, in terms of its possible relationship with the former. Moreover, the study focused on the reader and his processing of tasks of reading and listening comprehension. Hence screening procedures reflected the focus expressed.

Table Four

Profile of the Group of Less Able Readers

Subject	Sex	Comprehension Percentile Ranks	Non-Verbal I.Q. Scores	Chronological Age (Months)
21	F	27	118	109
22	F	31	113	112
23	F	31	85	124
24	F	1	92	123
25	F	14	93	109
26	F	31	103	120
27	F	5	87	109
28	F	24	113	120
29	F	34	102	111
30	F	31	100	110
N = 10 girls				
31	M	34	120	117
32	M	8	98	115
33	M	34	94	112
34	M	31	95	116
35	M	27	98	123
36	M	34	121	114
37	M	1	87	116
38	M	21	92	118
39	M	14	120	109
40	M	21	94	120
N = 10 boys				

Total = 20 children (10 girls and 10 boys)

Table Five

T-Tests (Independent Samples)

Differences Between the Means of Able and Less Able Readers' Groups on Percentile Ranks of Gates-MacGinitie Reading Test(A), I.Q. on Canadian Cognitive Abilities Test(B), and Age

Variables	Means		S.D.		DF	T	Probability	
	Able	Less Able	Able	Less Able			1-tail	2-tail
Gates-MacGinitie (Percentile Rank)	85.350	22.700	8.845	11.522	38	19.29	0.000	0.000***
I.Q. (C.C.A.T.)	109.750	101.250	11.102	11.986	38	2.33	0.013	0.025*
Age (in months)	113.350	115.350	3.561	5.133	38	-1.00	0.161	0.323

(A) Comprehension subtest (Level D, Form 2)

(B) Non-verbal (Level B, Form 1)

* = P < .05

** = P < .01

*** = P < .001

Screening Tests Used for the Selection of Subjects

The reading comprehension subtest of the Gates-MacGinitie Reading Test, Canadian Edition, Level D, Form 2 (1978) was selected to ascertain each child's achievement in silent reading comprehension. Form 2 was administered as a screening device to isolate the group of able readers whose performance was at or above the seventy-third percentile (grade equivalent = 5.7), and the group of less able readers whose performance was at or below the thirty-fourth percentile (grade equivalent = 3.8). Students responded to literal and inferential questions presented in multiple-choice format, following their silent reading of short passages (example in Appendix B) whose contents spanned the humanities, social sciences, and natural sciences (Manual, 1978, p. 35). Level D questions were posed to access 55 percent literal responses and 45 percent inferential responses from the readers. Level D was normed on 46,000 urban and rural Canadian students. Form 2 had a reliability of .87 on the reading comprehension subtest (Kuder-Richardson Formula 20).

The non-verbal section of the Canadian Cognitive Abilities Test, Level B, Form 1 (1974) provided an I.Q. score for each child and isolated those with I.Q.s of eighty-five and above as being eligible for inclusion in the study. The test was normed across Canada's ten provinces and the North West Territories, using a stratified random sample of schools. For the purposes of this study "standard age scores" having "the same statistical properties as the

deviation I.Q." were used to obtain I.Q. scores (Technical Manual, 1978, p. 3). The non-verbal battery of the C.C.A.T. required responses demanding abstract reasoning abilities with regards to figure analogies, figure classification, and figure synthesis. As the non-verbal battery did not contain a reading component its selection was deemed appropriate.

The screening tests were administered on a group basis at each of the four schools between the end of February and the beginning of April, 1982.

Testing Instruments Used with the Sample Population

Alternate forms of the Standard Reading Inventory (McCracken, 1966) were selected for the assessment of performance in reading and listening comprehension, the equivalence of Forms A and B having been established with Total Comprehension Scores: $r = 0.97$ ($p = 0.001$). Form A was used to obtain each student's instructional silent reading comprehension level, and Form B to obtain each student's instructional listening comprehension level (as noted in Table Six). The format of Forms A and B was identical and the presented passages contained similar subject matter (examples in Appendix B). Each form offered a range of passages graded from the pre-primer to grade seven level. Both oral and silent reading passages were provided at each grade level and, since the oral reading passages were more numerous below the grade four level, the oral passages were used for the present study, i.e. Form A oral reading passages were read silently to assess performance in silent reading

Table Six

Research Tasks for the Sample Population

Readers	Research Tasks	
	Reading Comprehension	Listening Comprehension
Able (20)	Form A of the Standard Reading Inventory	Form B of the Standard Reading Inventory
Less Able (20)	Form A of the Standard Reading Inventory	Form B of the Standard Reading Inventory

comprehension; Form B oral reading passages were narrated by a Western Canadian English speaker for the assessment of performance in listening comprehension.

Quantitative and qualitative evaluations were obtained for each child's performance on the tasks of reading and listening comprehension. As the child completed the reading or listening task he was asked to verbalize his recall of passage information, with no prompting from the researcher. All communication was tape recorded for subsequent transcription. The child's unaided recall of passage information at his instructional (a) reading, and (b) listening comprehension levels provided the raw data for qualitative analysis; examples are located in Appendix C. Each presented passage contained ten units of information. When one or more of those units were omitted in the child's unaided recall of passage information, questions were asked to elicit his comprehension of the omissions. Hence, the number of information units the child verbalized during his unaided recall plus the number of accurate responses given when questions were asked provided a total performance score. A total score of 70 percent or above obtained instructional level comprehension of passage information, and 69 percent and below reflected performance at frustration level. The child's instructional level comprehension performance for (a) silent reading, and (b) listening provided the raw data for quantitative analysis. Data concerning unaided and total recall scores, and individual instructional levels, are provided in Appendix D.

Administration of the Testing Instruments

Alternate forms of the Standard Reading Inventory (McCracken, 1966) were administered individually to each child during May, 1982. The children were tested in random order within each school and the administration of Forms A and B was counterbalanced, i.e. the first child was assessed first on Form A then on Form B, the second child was assessed first on Form B then on Form A, and so on. Each child took a short break between the administration of alternate forms. Form A was administered to obtain each child's instructional silent reading comprehension level, and Form B to obtain each child's instructional listening comprehension level. The passages used for listening comprehension were tape recorded, by a Western Canadian English speaker, to ensure consistent presentation. The point of entry into the reading and listening tasks was determined according to each child's performance on the Gates-MacGinitie Reading Test, Level D, Form 2 (1978), i.e. a percentile rank at or above the seventy-third percentile indicated that the child would process grade four level passages with some degree of competence, hence a grade four passage provided the point of entry; a percentile rank at or below the thirty-fourth percentile indicated that a child would process competently at the second or third grade level, hence the child's point of entry was determined accordingly. In all cases, subsequent passages were presented according to the child's performance on the first passage provided, i.e. if instructional or

independent comprehension levels were achieved during processing of the first passage, the second passage presented was at the next grade level; if frustration level occurred during processing of the first passage, the second passage presented was at the preceding grade level.

Task Instructions

Prior to processing each of the passages the child was told, "This story is called (title). Read the story silently (or "Listen to the story -") and tell me about the story when you have finished." On task completion the child was reminded, "Tell me about the story (title)."

Scoring of the Instruments

The child's performance on both tasks was assessed according to the following criteria. Each passage contained ten units of information. As the child verbalized his recall of passage information, the items recalled were noted. His unaided recall score represented the number of information units recalled accurately, i.e. if eight of the units were recalled his unaided recall score was recorded as $^{8}/_{10}$ or 80 percent. Probe questions were then asked to elicit his comprehension of the remaining information units. Correct responses were added to his unaided recall score to obtain a total score. If all ten information units were recalled accurately the child's unaided score of 80 percent plus the 20 percent received for responses to the questioning yielded a total recall score of 100 percent.

Each child's instructional comprehension level for (a) the reading task, and (b) the listening task was established at the last grade level passage on which he achieved a total recall score of 70 percent or above. Thus, two distinct instructional comprehension levels were obtained for each child. One provided his instructional silent reading comprehension level and the other provided his instructional listening comprehension level. Since the demonstration of an instructional level may be assumed to mean that similar cognitive operations must have contributed to that level, regardless of the graded level of the passage processed, each child's unaided recall of passage information at his instructional reading and listening comprehension levels constituted the raw data for qualitative analysis.

Interpretation of Instructional Level Unaided Recalls

In order to access the quality of the child's processing, mazes were eliminated from the verbatim transcripts of his instructional level unaided recalls for the reading and listening tasks. Transcript contents were then divided into clausal units and analyzed according to Fagan's Comprehension categories for protocol analysis (Fagan, in press). Semantic categories were assigned to each clausal unit to ascertain, as closely as possible, what occurred in the child's mind as he read or listened to the presented passage. Although the researcher could not know, beyond a shadow of a doubt, the complexity of interrelated ideas in the child's mind as he processed the written or narrated discourse, Fagan's method

of qualitative analysis allowed partial access to the processing strategies which the child engaged whilst reading and listening.

Inter-rater reliability on 10 percent of the obtained recalls, for division of protocols into clausal units and for assigning semantic categories to each unit, was established using the Arrington Formula (Feifel and Lorge, 1950), i.e.

$$\frac{(2 \times \text{Agreements})}{(2 \times \text{Agreements}) + \text{Disagreements}}$$

Judge One was a reading specialist employed by the Bureau of Child Studies, Edmonton Public School Board. Judge Two was the writer. The proportion of agreement between judges was as follows:

(a) Division into clausal units .975

(b) Assignment of semantic categories .922

The Division of Protocols into Clausal Units

Researchers have tended to use one of three different units of analysis for dividing recall protocols prior to the assignment of semantic categories. The three most widely used units have been the t-unit/incomplete t-unit, the clause, and the syntactic proposition. Fagan and Currie (1981) raised the possibility that the results of assigning semantic categories to units could differ, depending on the unit of analysis chosen. Hence they computed Pearson Product Moment Correlation Coefficients on sixteen recall protocols which had been analyzed according to the three different language units and assigned to semantic categories,

in order to shed some light on the problem. Analysis of the data showed a significant correlation beyond the .001 level between categories assigned to t-units/incomplete t-units and clausal units. Syntactic propositions provided a somewhat different profile. The authors proposed, therefore, that:

> ... the use of either the t-unit/incomplete t-unit or the clause as units of language analysis will result in similar mean and standard deviation sizes and a high degree of consistency in terms of the profile obtained when the units are assigned to a system of comprehension categories. (Fagan and Currie, 1981, p. 9)

This being the case, the decision to use clausal units in the present study allied the interpretation of recall protocols more specifically with recent studies on fourth grade readers, where the clausal unit had been selected as the unit of analysis (Beebe, 1981; Brailsford, 1981; Machura, 1981); however, due to Fagan and Currie's findings, the choice of clausal units did not discount potential comparisons with fourth grade studies which employed the t-unit/incomplete t-unit as units of language analysis.

The Assignment of Semantic Categories

After mazes were eliminated each recall protocol was divided into clausal units and analyzed according to Fagan's Comprehension categories for protocol analysis (Fagan, in press). Each unit was assigned to one or more of the five comprehension categories:

A Text Exact - verbatim and partially recalled information:

A1 Verbatim Recall - word by word, or including a substitution which does not change the meaning:

(a) Text and Protocol: The boys were late for school.

(b) Text: He chased the animal.
Protocol: He chased an animal.

A2 Partial Recall - a significant concept is omitted:

(a) Text: The children had never seen such a tiny colt.
Protocol: The children had never seen such a colt.

B Text Specific - substitution of pronouns and synonymy of elements:

B1 Substitution of Pronouns - retains the noun referent:

(a) Text: People were very kind to the stranger.
Protocol: They were very kind to the stranger.

B2 Synonymy of Elements

(a) Text: The house was on fire.
Protocol: The house was burning.

C Text Entailed - a synthesis or summary:

C1 Synthesis

(a) Text: While visiting her Aunt Lizzie at the farm last weekend, Teri helped harvest some carrots, peas, zucchini and tomatoes.
Protocol: Last weekend, Teri helped her Aunt harvest some vegetables.

C2 Summary

(a) Text: She jumped into the icy water. She was trying to save the swimmer who was in trouble.
Protocol: She jumped into the icy water to save a swimmer in trouble.

D Text Experiential - inferences, case-related information, experiential intrusions, and storyline additions:

D1 Inference - constrained by the text:

(a) Text: The mother bundled the children in their parkas, scarves and mittens. She was sure they all had a hot lunch as they left for school.
Protocol: It was a cold day.

D2 Case-Related Information - expansions based on prior knowledge:

(a) Text: He ground corn.
Protocol: He ground corn with a rock.

D3 Experiential Intrusions - prior knowledge related to the text:

(a) Text: The little boy had disobeyed his mother. She had told him to wait by the car while she went back to the store for the other bag of groceries. Now she could not find him anywhere.
Protocol: One time I saw this woman looking everywhere for her little boy. He went up the escalator when she wasn't looking.

D4 Storyline Additions - experiential base, contextually appropriate, not constrained by specific text:

(a) Text: The stranger saw the man was weak and finally dug a hole through the ice for him.
Protocol: The man said "I am not able to dig the hole." But the stranger said "You got to keep trying and trying." The man said "I just can't do it."

E Text Erroneous - errors in dates, proper names, expansions, synthesis, summary, and inference:

E1 Errors in Dates and Proper Names:

(a) Sir Wilfred Laurier/Sir Wilfred Bennett

(b) 1864/1872

E2 Erroneous Expansions - conceptual errors:

(a) Text: They ground corn.
Protocol: They ground corn by heating it.

E3 Inaccurate/Incorrect Synthesis - different units of textual information result in (1) an inaccurate superordinate referent, or (2) generalization not conveying the gist of the passage:

(a) Text: We shouldn't always knock computers when they seem to make an error on our accounts. Granted we might be upset when our balance is nil and the computer still insists that we send a check for $40.00. However, if computers were assigned to do the many menial tasks of administrative affairs and leave more time for humans to use their intelligence to solve the more significant problems, then computers and humans would be compatible and would coexist in harmony.
Protocol: Computers are frustrating.

E4 Inaccurate/Incorrect Summary - referential confusion on combining information:

(a) Text: The dogs lay down and refused to move. The man dragged the sled all the way to the cabin.
Protocol: The dogs dragged the sled to the cabin.

E5 Faulty Inference

(a) Text: Mrs. Gray knew it was two o'clock because she could hear Henry, her parrot squawking. He wanted to watch his favorite T.V. program. But Mrs. Gray thought that too much T.V. was bad for Henry's eyes so she told him to rest instead. He squawked even louder so she finally turned on the T.V. set. After Henry's show was

over, she stayed to watch a show on cooking.
Protocol: Mrs. Gray came in from the garden to watch her T.V. show.
(Selected from Fagan, in press)

Fagan established validity and reliability within and across the comprehension categories. A monograph of the article, Comprehension categories for protocol analysis (Fagan, in press) may be examined in Appendix C in its entirety.

Within the present study, although the sub-categories provided necessary discussion during pre and post inter-rating periods (e.g. D1, D2, D3, D4), the major categories of A, B, C, D, and E constituted the data to be analyzed. As the total number of clausal units varied between recall protocols, percentaged scores were calculated to determine the quantity of information assigned to each category within every recall protocol. For example, if a recall protocol contained ten clausal units and comprehension categories had been assigned to the units as follows: A = 5, B = 3, C = 1, D = 0, and E = 1, the percentaged scores were recorded as A = 50%, B = 30%, C = 10%, D = 0%, and E = 10%.

Analysis of the Data

Two-way analyses of variance (ANOV 26) with repeated measures on Factor B were computed. Factor A independent variables were the groups of Able and Less Able readers. Factor B dependent variables were the various aspects of the Reading and Listening Comprehension treatments.

Subsequent to the major analyses above, one-way analyses

of variance (ANOV 10) were used to assess statistical differences between groups in terms of Fagan's Text Entailed (summary/synthesis) comprehension category.

Summary

Twenty able readers and twenty less able readers were selected from the fourth grade population of four schools in the County of Parkland No. 31, near Edmonton, Alberta. Form A (silent reading comprehension) and Form B (listening comprehension) of the Standard Reading Inventory (McCracken, 1966) were administered individually to each of the forty children in the sample. The children's responses were tape recorded and instructional level verbatim recall protocols were transcribed, on the same day, for subsequent analysis. Each recall protocol was divided into clausal units and analyzed according to Fagan's Comprehension categories for protocol analysis (Fagan, in press) after all of the assessments were completed. Statistical treatment of the data consisted of one and two-way analyses of variance.

CHAPTER IV

FINDINGS AND DISCUSSION

The dual purpose of this study was to ascertain whether fourth grade students process instructional level tasks of reading and listening comprehension in a similar manner regardless of mode of input, and whether able and less able readers engage similar cognitive processing strategies during tasks of receptive language comprehension. In order to address the purpose hypotheses were formulated, and tested on the basis of a .05 level of acceptable significance (Ferguson, 1976, p. 162). Instructional level performances on the tasks of reading and listening comprehension were obtained for quantitative analysis, and to provide a springboard from which qualitative observations might be advanced regarding the nature of cognitive processes engaged during receptive language comprehension.

Hypothesis One A

For able readers, performances in listening and reading comprehension will be significantly greater than those of less able readers for both treatments, as reflected in instructional levels.

Hypothesis One B

For able and less able readers, performance in

listening comprehension will be significantly greater than performance in reading comprehension, as reflected in instructional levels.

Instructional reading and listening comprehension levels were obtained using Forms A and B, respectively, of the Standard Reading Inventory (McCracken, 1966). The levels obtained were used to test Hypotheses One A and B. Based upon the findings of previous research it was anticipated that the able readers' performance would exceed that of the less able readers for both tasks (Smiley et al, 1977; Sticht et al, 1974) and that performance in listening comprehension would be significantly greater than performance in reading comprehension for both able and less able readers (Smiley et al, 1977; Sticht et al, 1974).

Findings Related to Hypotheses One A and B

A two-way analysis of variance (ANOV 26) was computed with Factor A independent variables denoting the able and less able readers' groups, and Factor B dependent variables consisting of instructional reading and listening comprehension performance levels for each child in the sample. A summary of the ANOVA is presented in Table Seven.

A significant Factor A main effect was obtained, indicating that the performance of the able readers was significantly greater than that of the less able readers collapsed over both reading and listening tasks and within each discrete treatment, at the $P < .01$ level of significance

Table Seven

Two-Way Analysis of Variance on the Dependent Variables of Instructional Level Performances in Reading and Listening Comprehension

Source of Variation	SS	DF	MS	F	P
Between Subjects	89.550	39			
'A' Main Effects (Able/Less Able)	20.002	1	20.002	10.929	0.00207**
Subjects Within Groups	69.550	38	1.830		
Within Subjects	29.500	40			
'B' Main Effects (Reading/ Listening)	10.515	1	10.515	21.056	0.00005***
'A x B' Interaction	0.010	1	0.010	0.020	0.88785
'B' x Subjects Within Groups	18.975	38	0.499		

* = P < .05
** = P < .01
*** = P < .001

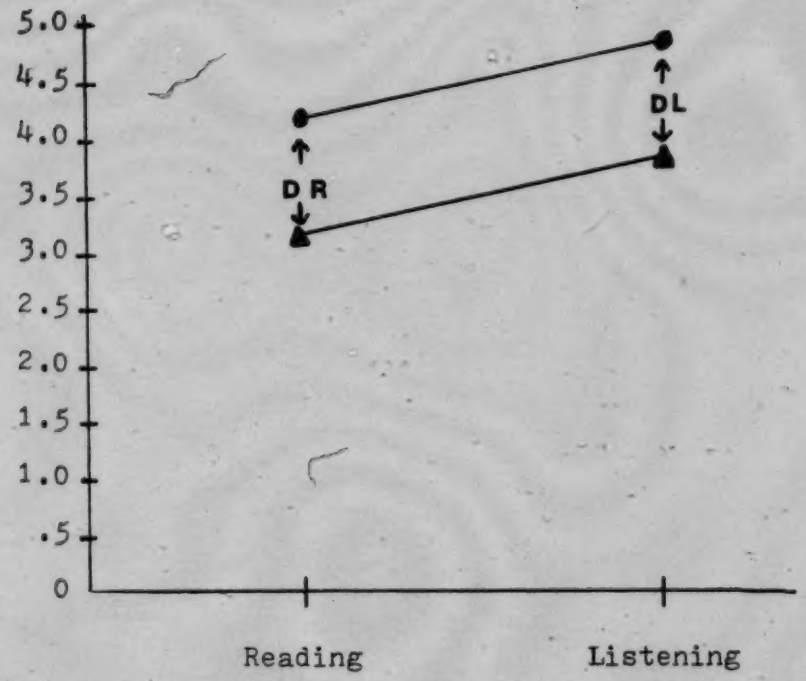
(c.f. Hypothesis One A). In addition a significant main effect for Factor B was demonstrated, indicating that performance in listening comprehension was significantly greater than performance in reading comprehension for both groups at the $P < .001$ level of significance (c.f. Hypothesis One B). The Factors A x B interaction was not significant and it was assumed that the lines illustrated in Figure 2 represented a parallel effect in the fourth grade population, i.e. that performance in listening comprehension would be significantly greater than performance in reading comprehension for the represented fourth grade population.

Hypotheses One A and B were accepted, therefore, as stated.

Discussion Related to the Findings

The findings corroborate those noted previously of Smiley et al (1977), and Sticht et al (1974), i.e. that able readers tend to be able listeners whereas less able readers tend to be less able listeners, and that performance in listening comprehension generally exceeds performance in reading comprehension at the fourth grade level. Figure 2 provides data for each group with respect to performance levels on both tasks. The means scores were used to illustrate the parallel lines' effect with DR depicting the reading performance means' difference between groups and DL denoting the same comparison for listening. The diagram illustrates clearly that performance levels of able readers exceed those of less able readers by equal amounts on both

Means Scores for the Able and Less Able Groups



	Reading	Listening	
● = Able Readers:	4.200	4.950	Means Scores
▲ = Less Able Readers:	3.225	3.925	

DR = Difference between means scores for reading

DL = Difference between means scores for listening

Figure 2

Instructional Reading and Listening Comprehension Levels

(Standard Reading Inventory)

tasks; a factor which allies with the findings of Berger (1975), Berger and Perfetti (1977), Smiley et al (1977), Sticht (1972), Sticht et al (1974), and Weisberg (1979). Two explanations regarding the "equal amounts" factor have been advanced previously; explanations that may be viewed beneath a single umbrella since they are essentially compatible, i.e. Berger and Perfetti (1977) suggest that the "equal amounts" factor points towards the less able readers' generally "... reduced ability to comprehend language" (p. 13); Sticht et al (1974) see the difference being due to developmental variance between groups.

Any attempt to shed more light on the issue, and to advance additional potential explanations, first necessitates observations regarding the nature of the cognitive processing which led to the instructional levels achieved. Hence, the findings and discussion pertinent to the processing strategies engaged will be presented prior to synthesis.

Hypothesis Two: Parts A to E

There are no significant differences between the cognitive processing strategies employed by able and less able readers during the processing of instructional level tasks of reading and listening comprehension, as reflected in Fagan's Comprehension categories for protocol analysis (Fagan, in press):

A There are no significant differences in the number of Text Exact categories recalled by able and less able readers on tasks of reading and listening

comprehension.

B There are no significant differences in the number of Text Specific categories recalled by able and less able readers on tasks of reading and listening comprehension.

C There are no significant differences in the number of Text Entailed categories recalled by able and less able readers on tasks of reading and listening comprehension.

D There are no significant differences in the number of Text Experiential categories recalled by able and less able readers on tasks of reading and listening comprehension.

E There are no significant differences in the number of Text Erroneous categories recalled by able and less able readers on tasks of reading and listening comprehension.

In order to test parts A to E of Hypothesis Two an unaided recall of instructional level processing was obtained from each child for the tasks of (1) reading comprehension, and (2) listening comprehension. Each recall protocol was divided into clausal units and comprehension categories were assigned to the units according to Fagan's Comprehension categories for protocol analysis (Fagan, in press), as described in Appendix C. It was anticipated that qualitative observations, regarding the nature of cognitive processes engaged by both groups during both tasks of

receptive language comprehension, would reveal the engagement of similar processes regardless of reading ability levels and specific mode of input.

A 2 (Able and less able readers; Factor A) x 2 (Listening and reading comprehension; Factor B) analysis of variance, with repeated measures on the latter factor, was carried out for each of the five comprehension categories: (A) Text Exact, (B) Text Specific, (C) Text Entailed, (D) Text Experiential, and (E) Text Erroneous (Fagan, in press).

Findings Related to Hypothesis Two A

As illustrated in Table Eight, there were no significant main effects for Factors A or B and the Factors A x B interaction was not significant. The findings indicated that whether fourth grade able and less able readers were required to read or listen to instructional level passages of prose, they recalled similar amounts of verbatim/almost verbatim (i.e. Text Exact) textual information, i.e. able and less able readers recalled similar amounts of Text Exact information, and there were no significant differences in the amounts recalled for the listening and reading tasks.

Hypothesis Two A was accepted, therefore, as stated.

Table Eight

Two-Way Analysis of Variance with One Factor Repeated for the Text Exact Comprehension Category

Source of Variation	SS	DF	MS	F	P
Between Subjects	10231.188	39			
'A' Main Effects (Able/Less Able)	244.102	1	244.102	0.929	0.34128
Subjects Within Groups	9987.125	38	262.819		
Within Subjects	6719.625	40			
'B' Main Effects (Reading/ Listening)	185.508	1	185.508	1.134	0.29359
'A x B' Interaction	319.351	1	319.351	1.953	0.17041
'B' x Subjects Within Groups	6214.750	38	163.546		

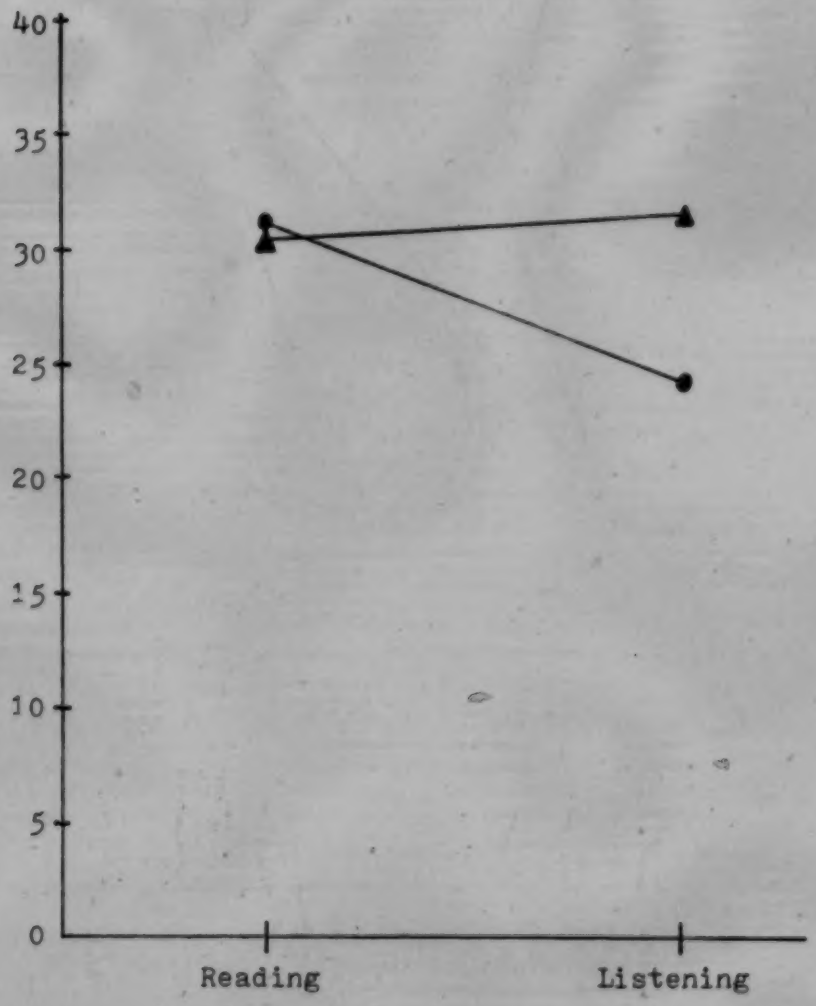
* = P < .05
** = P < .01
*** = P < .001

Discussion Related to the Findings (Hypothesis Two A)

During the processing of instructional level tasks of receptive language comprehension fourth grade able and less able readers appear to be constrained by textual information to a similar degree, regardless of the mode of input. However, although the Factors A x B interaction was not significant, some interaction did occur as noted in Figure 3. Whereas less able readers' production of Text Exact information was relatively constant for both reading and listening, with mean percentage scores of 30.68 and 31.63 respectively, the able readers demonstrated a trend towards less production of Text Exact information for the listening task (mean = 24.14%) than for the reading task (mean = 31.19%). Figure 4 illustrates the downward trend clearly. Each box contains the scores for half of the group to which it pertains. The bottom of each box illustrates the fifth-ranked score (twenty-fifth percentile), and the top of each box represents the fifteenth-ranked score (seventy-fifth percentile). The range of each group is indicated by the positions denoted for the first and twentieth-ranked scores.

Since percentaged scores represent a closed-ended system of analysis (i.e. the sum of the distribution of scores = 100%), the able readers' lowered production of Text Exact information during listening comprehension must be reflected elsewhere within the distribution of the four remaining categories, within the listening situation. Moreover, since the remaining categories require the

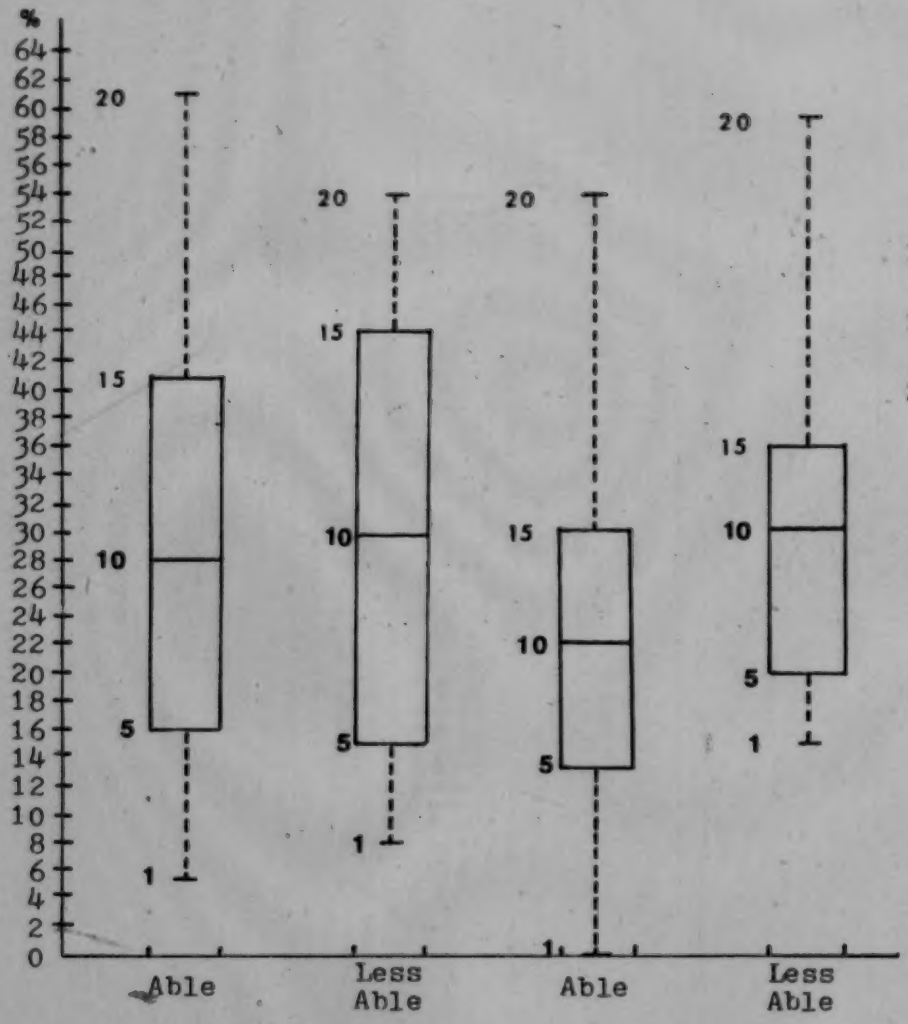
Means Scores for the Able and Less Able Groups
(expressed as a percentage of the total information recalled)



● = Able Readers: 31.19 (Reading) 24.14 (Listening)
▲ = Less Able Readers: 30.68 (Reading) 31.63 (Listening)
(no significant interaction)

Figure 3

Text Exact Comprehension



Scores in ranked order:

1 = 1st score (lowest limit of range)

5 = 5th score (25th percentile)

10 = 10th score (50th percentile)

15 = 15th score (75th percentile)

20 = 20th score (highest limit of range)

(Design adapted from Tukey, 1977)

Figure 4: Text Exact Comprehension Category for Protocol Analysis

engagement of reconstructive strategies on the part of the processor, as opposed to verbatim recall, it is reasonable to suggest that able readers demonstrate a trend towards being less constrained by passage information and more prone to engage reconstructive cognitive processes when listening than when reading. Further reference to this factor will be made subsequent to the presentation of findings and discussion regarding Hypothesis Two B through E.

Findings Related to Hypothesis Two B

There were no significant main effects for Factors A or B, nor was there a significant Factors A x B interaction (c.f. Table Nine). The findings suggested that both able and less able readers recalled similar amounts of Text Specific information and that there were no significant differences in the amounts recalled for the reading and listening tasks.

Hence, Hypothesis Two B was accepted as stated.

Discussion Related to the Findings (Hypothesis Two B)

When processing instructional level tasks of reading and listening comprehension both able and less able fourth grade readers recalled similar amounts of information that had specific references in the input (read or heard), with some degree of reconstructive processing being evident: e.g. Text ... and his sharp teeth fought off the dogs ... Protocol ... (he) fought off the dogs with his sharp teeth ... (Standard Reading Inventory, Form A, Level 4)

Table Nine

Two-Way Analysis of Variance with One Factor Repeated for the Text Specific Comprehension Category

Source of Variation	SS	DF	MS	F	P
Between Subjects	8926.625	39			
'A' Main Effects (Able/Less Able)	298.398	1	298.398	1.314	0.25881
Subjects Within Groups	8628.250	38	227.059		
Within Subjects	7699.750	40			
'B' Main Effects (Reading/ Listening)	0.195	1	0.195	0.001	0.97541
'A x B' Interaction	30.405	1	30.405	0.151	0.70008
'B' x Subjects Within Groups	7669.125	38	201.819		

* = P < .05
** = P < .01
*** = P < .001

The current findings, to date, ally with those of previous studies in the field of reading research (Brake, 1981; Clarke, 1981; Kavanagh, 1981), with regards to the similarity of processing strategies used by able and less able readers when processing instructional level passages of printed prose. It would appear that, at least in respect of processing reflected by Text Exact and Text Specific comprehension categories, the fourth grade information processor engages similar cognitive processing strategies for both tasks of receptive language comprehension.

Findings Related to Hypothesis Two C

A significant Factor A main effect was demonstrated, indicating that the production of Text Entailed comprehension categories by able readers was significantly greater than that of the less able readers, collapsed over both reading and listening tasks at the $P < .01$ level of significance. The Factor B main effect was not significant, nor was the Factors A x B interaction. Table Ten provides a summary of the salient details.

Since a two-way analysis of variance provided results collapsed over both of the tasks, t-tests were computed in order to determine whether the significant difference obtained by able readers could be delineated more succinctly. Table Eleven states the results of the t-tests and Figure 5 illustrates where the difference lies.

Hypothesis Two C was rejected as a significant able x less able readers' difference was obtained on listening

Table Ten

Two-Way Analysis of Variance with One Factor Repeated for the Text Entailed Comprehension Category

Source of Variation	SS	DF	MS	F	P
Between Subjects	2069.263	39			
'A' Main Effects (Able/Less Able)	306.038	1	306.038	6.596	0.01428**
Subjects Within Groups	1763.227	38	46.401		
Within Subjects	1547.883	40			
'B' Main Effects (Reading/ Listening)	12.477	1	12.477	0.311	0.58010
'A x B' Interaction	12.917	1	12.917	0.322	0.57352
'B' x Subjects Within Groups	1522.486	38	40.065		

* = P < .05
** = P < .01
*** = P < .001

Table Eleven

The Results of T-Tests for Independent Means Comparing Able and Less Able Readers' Production of Text Entailed Information During Tasks of Reading and Listening Comprehension

	Means		Standard Deviation		DF	T	Probability	
	Able	Less Able	Able	Less Able			1-tail	2-tail
Reading	5.873	2.765	7.699	5.024	38	1.51	0.069	0.139
Listening	7.467	2.751	7.633	5.491	38	2.24	0.015	0.031 *

* = P < .05
** = P < .01
*** = P < .001

Means Scores for the Able and Less Able Groups
(expressed as a percentage of the total information recalled)

	Reading	Listening
● = Able Readers:	5.873	7.467
▲ = Less Able Readers:	2.765	2.751

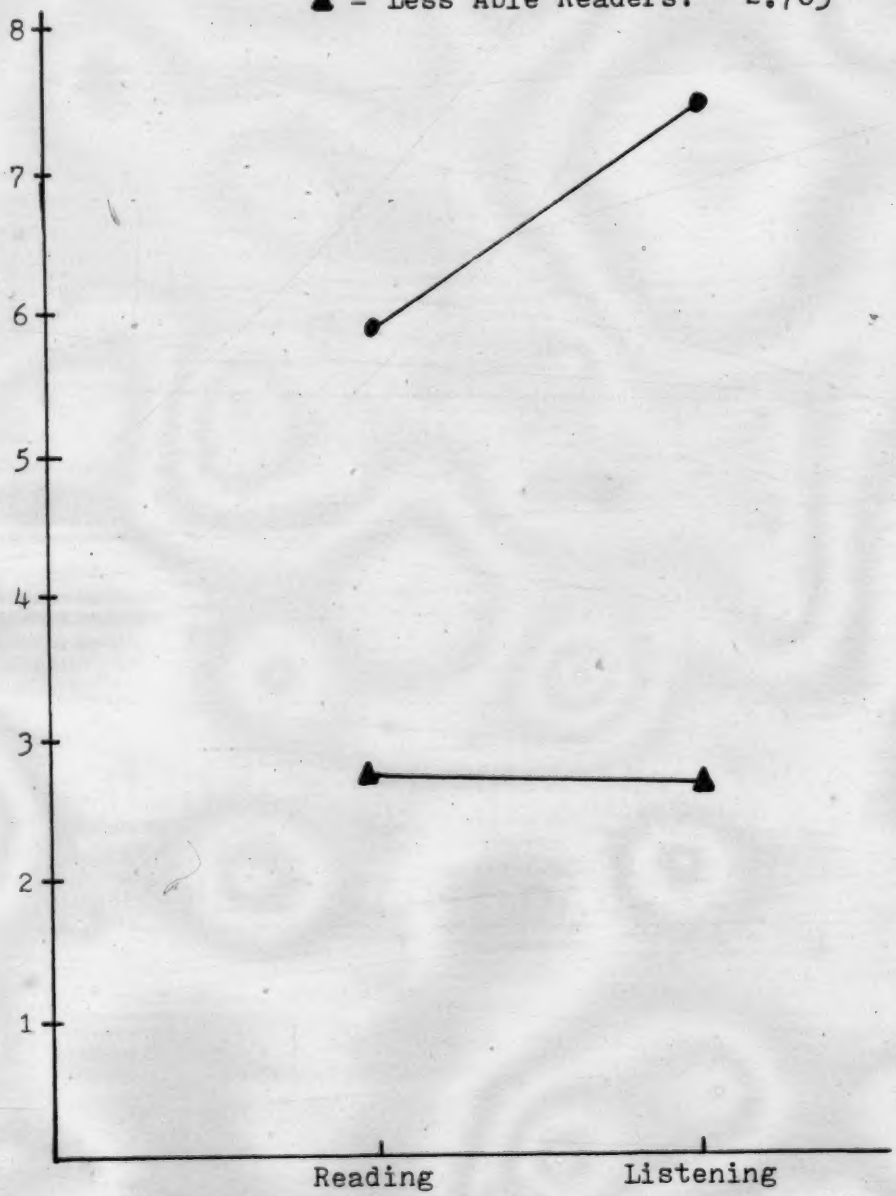


Figure 5

Text Entailed Comprehension

comprehension. Able readers produced a significantly greater amount of Text Entailed information during the listening comprehension task ($F = 6.596$, $P < .05$: c.f. Table Eleven). No significantly greater able than less able group difference was noted during reading comprehension, although a trend towards the production of more Text Entailed information was observed in favour of the able readers (c.f. Figures 6 and 7).

Discussion Related to the Findings (Hypothesis Two C)

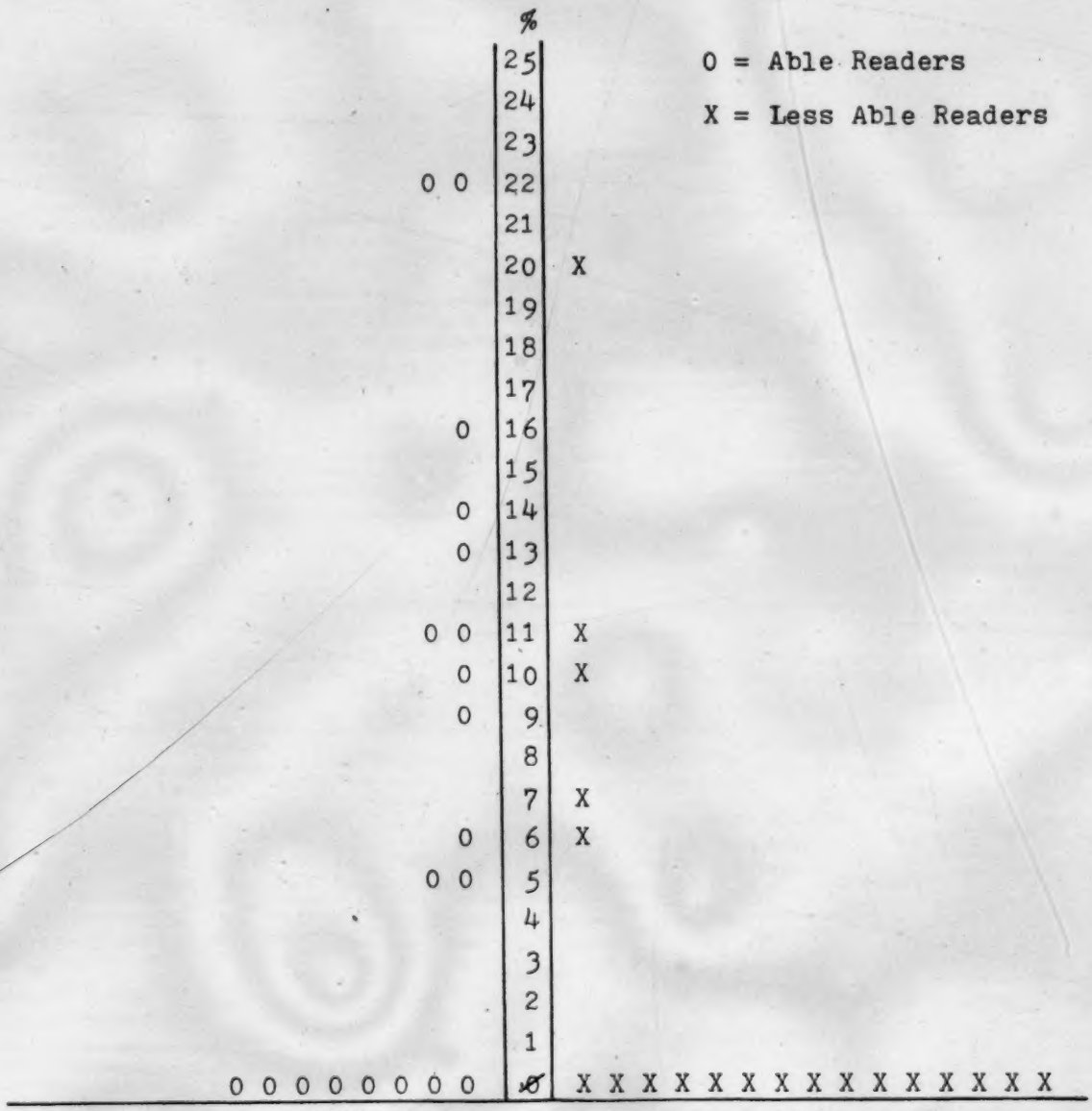
The production of Text Entailed information requires the synthesizing or summarizing of at least two units of passage details. Syntheses and summaries indicate that the processor has adequately understood intra- and/or inter-sentential relationships:

e.g. Text Out by the edge of the sea ice a lone hunter, Anauta, struggled to land a walrus he had just harpooned.

Protocol ... and a hunter was out harpooning ... (Standard Reading Inventory, Form B, Level 6)

The superordinate statement noted in the above protocol suggests that the processor has engaged in reconstructive processing prior to retrieval and recall of passage information. The reconstructive factor demonstrated in the production of Text Entailed information by able readers within the listening context, to a significant degree, lends credence to the suggestion arising from findings related to Hypothesis Two A, i.e. that "able readers demonstrate a trend towards being less constrained by passage information

Distribution Between Groups and Within Groups
(expressed as percentages of total information recalled per student)

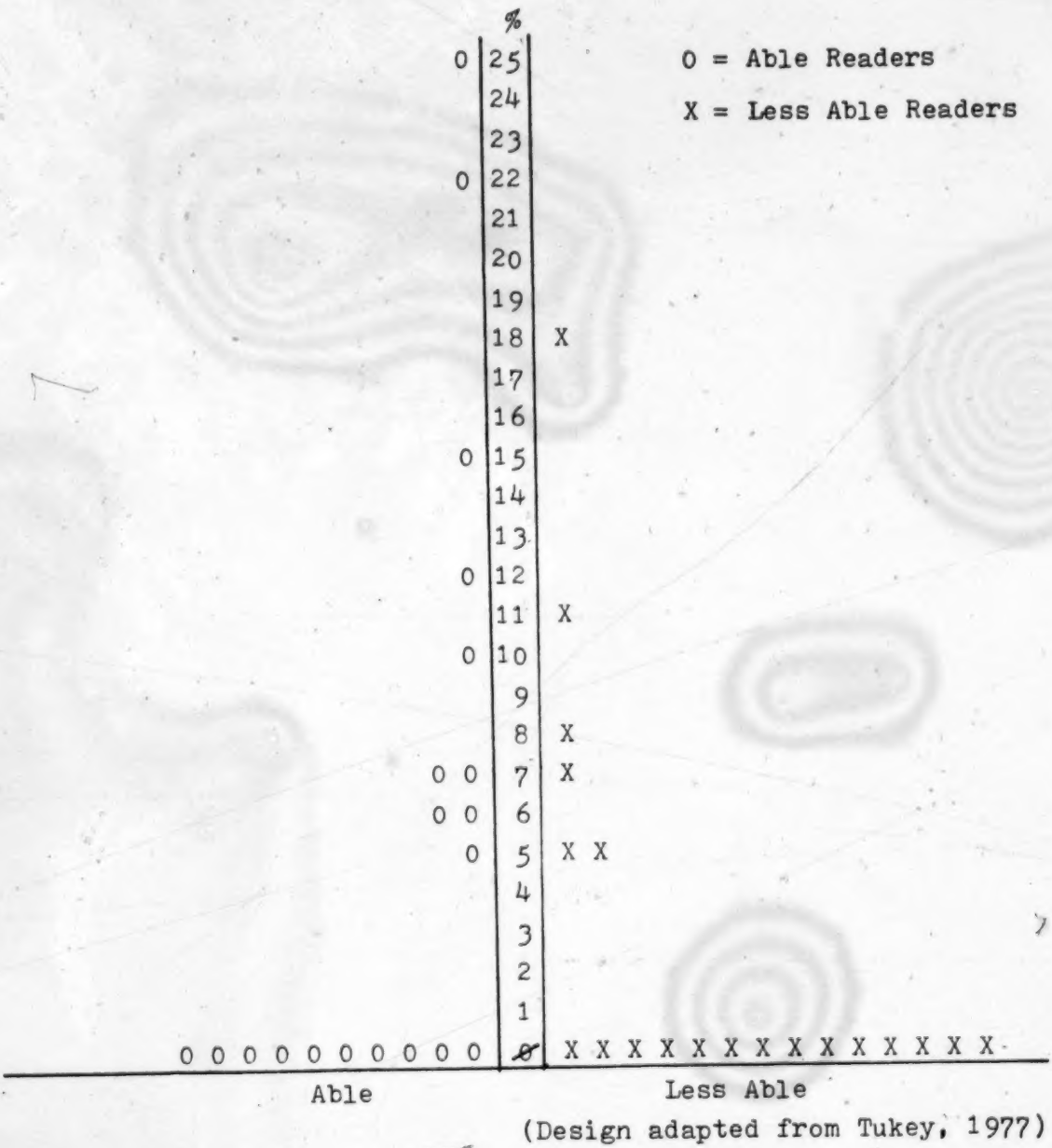


(Design adapted from Tukey, 1977)

Figure 6

Text Entailed Comprehension (Listening)

Distribution Between Groups and Within Groups
(expressed as percentages of total information recalled per student)



(Design adapted from Tukey, 1977)

Figure 7

Text Entailed Comprehension (Reading)

and more prone to engage reconstructive cognitive processes when listening than when reading" (p. 80). Figures 6 and 7 illustrate the distribution of Text Entailed information between groups and for both tasks.

Findings Related to Hypothesis Two D

There were no significant main effects for Factors A or B, and the Factors A x B interaction was not significant (c.f. Table Twelve). The findings indicated that able and less able readers recalled similar amounts of Text Experiential information, and did so for both of the receptive language comprehension tasks.

Thus, Hypothesis Two D was accepted as stated.

Discussion Related to the Findings (Hypothesis Two D)

The recall of Text Experiential information implies that previous experiences, actual or vicarious (reading/hearing about, seeing on movies/T.V.), have been reactivated by the incoming information. The processor combines his prior knowledge with explicitly stated information received, and reconstructs the input to arrive at a conclusion which may have been implicit in the author's message:

e.g. Text The hooting of the horned owl was well known to the orphan beaver.

Protocol There was this owl / that always would hoot ... (Standard Reading Inventory, Form A, Level 4)

The findings related to Hypothesis Two D suggest that able and less able fourth grade readers reactivate prior knowledge

Table Twelve

Two-Way Analysis of Variance with One Factor Repeated for the Text Experiential Comprehension Category

Source of Variation	SS	DF	MS	F	P
Between Subjects	11394.438	39			
'A' Main Effects (Able/Less Able)	298.867	1	298.867	1.024	0.31808
Subjects Within Groups	11095.563	38	291.988		
Within Subjects	10583.938	40			
'B' Main Effects (Reading/ Listening)	8.398	1	8.398	0.030	0.86289
'A x B' Interaction	21.729	1	21.729	0.078	0.78122
'B' x Subjects Within Groups	10553.813	38	277.732		

* = P < .05
** = P < .01
*** = P < .001

to a similar degree in order to reconstruct incoming information (read/heard) in a manner that "fills in the gaps" implicit in the original message (Fagan, Appendix C, p. 151).

Findings Related to Hypothesis Two E

There were no significant main effects for Factors A or B, and the Factors A x B interaction was not significant (c.f. Table Thirteen). Both able and less able readers recalled similar amounts of Text Erroneous information, and did so for both reading and listening comprehension tasks.

Hypothesis Two E was accepted, therefore, as stated.

Discussion Related to the Findings (Hypothesis Two E)

Regardless of mode of input, fourth grade able and less able readers produced similar amounts of Text Erroneous information either during or subsequent to the processing of instructional level tasks of reading and listening comprehension:

e.g. Text Out of the night came a silent shadow.

Protocol ... he heard this noise ...

(Standard Reading Inventory, Form A, Level 4)

However, although the Factors A x B interaction was not significant some interaction, as noted in Figure 8, did take place. Whilst the less able readers' production of Text Erroneous information remained fairly constant during both tasks of receptive language comprehension, with mean percentage scores of 6.06 and 6.85 respectively, the able readers showed a trend towards the production of more Text

Table Thirteen

Two-Way Analysis of Variance with One Factor Repeated for the Text Erroneous Comprehension Category

Source of Variation	SS	DF	MS	F	P
Between Subjects	3258.636	39			
'A' Main Effects (Able/Less Able)	3.445	1	3.445	0.040	0.84215
Subjects Within Groups	3255.191	38	85.663		
Within Subjects	1659.984	40			
'B' Main Effects (Reading/ Listening)	57.971	1	57.971	1.390	0.24579
'A x B' Interaction	16.817	1	16.817	0.403	0.52929
'B' x Subjects Within Groups	1585.192	38	41.716		

* = P < .05
** = P < .01
*** = P < .001

Means Scores for the Able and Less Able Groups
(expressed as a percentage of the total information recalled)

	Reading	Listening
● = Able Readers	4.73	7.34
▲ = Less Able Readers	6.06	6.85

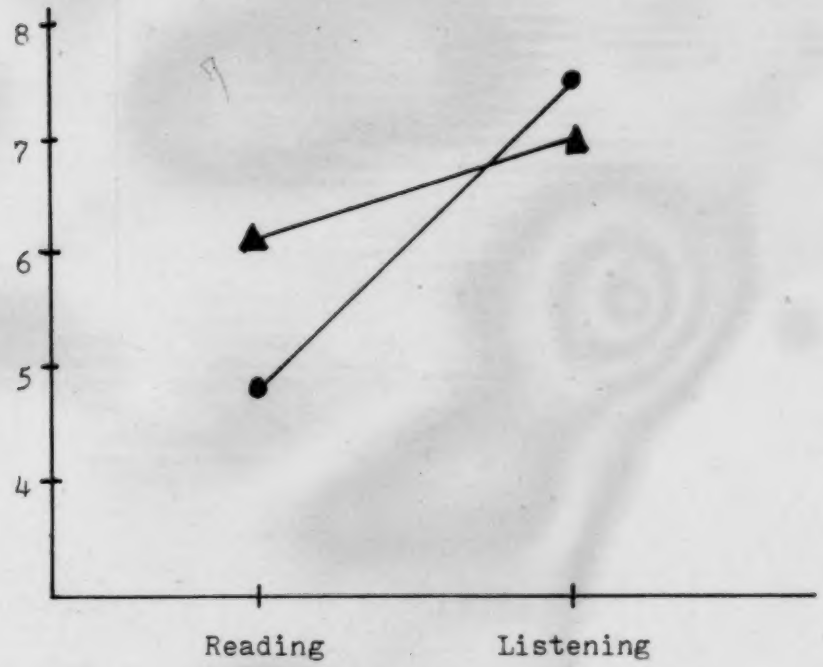
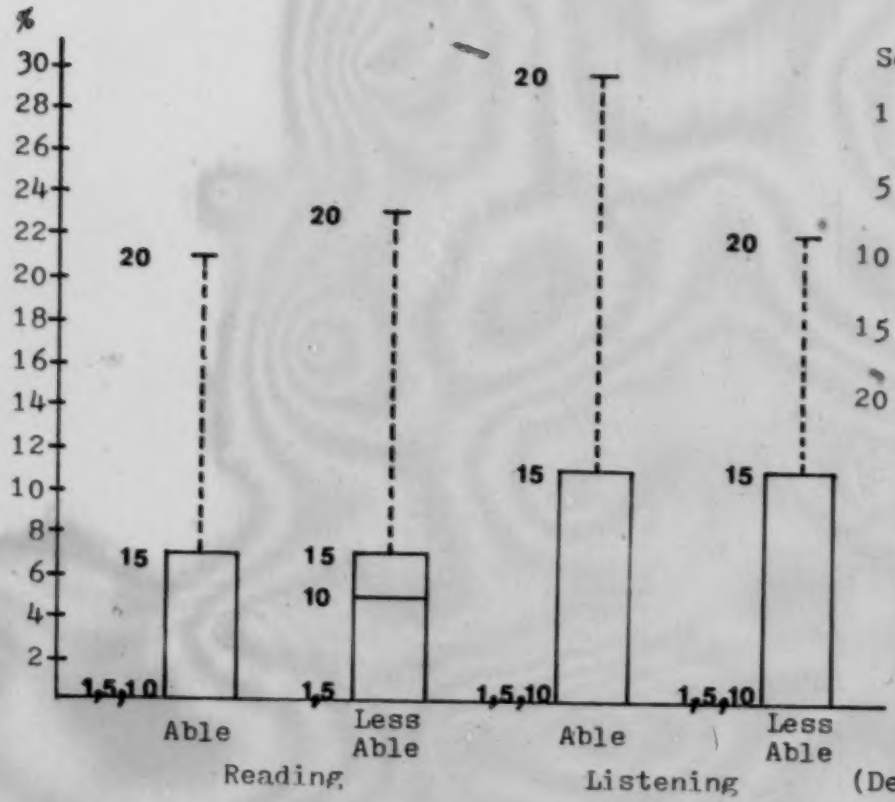


Figure 8

Text Erroneous Comprehension

Erroneous information within the listening task (mean = 7.34%) than within the reading task (mean = 4.73%). Within the parameters of the overall statistical analyses the production of Text Erroneous information was minimal. However, in the case of able readers with regards to their processing of narrated prose certain assumptions remain to be discussed, i.e. whereas able readers demonstrated a trend towards the production of less Text Exact information when listening than reading (Hypothesis Two A), the findings related to Hypothesis Two E indicated an able readers' trend towards the production of more Text Erroneous information when listening than when reading. Figure 9 illustrates the distribution of Text Erroneous processing with clarity. It may be suggested that, within the listening task, as the able readers became less constrained by passage information their reconstructive processing resulted in the recall of some erroneous information; a factor which to some extent offers a counter-balancing situation, with Text Exact and Text Erroneous information at diametrically opposite ends of the information processing continuum.

The following overview of the findings related to Hypotheses One and Two examines the interrelationships of discrete findings when viewed within the holistic framework of the combined analyses.



Scores in ranked order:

1 = 1st score (lowest limit of range)

5 = 5th score (25th percentile)

10 = 10th score (50th percentile)

15 = 15th score (75th percentile)

20 = 20th score (highest limit of range)

(Design adapted from Tukey, 1977)

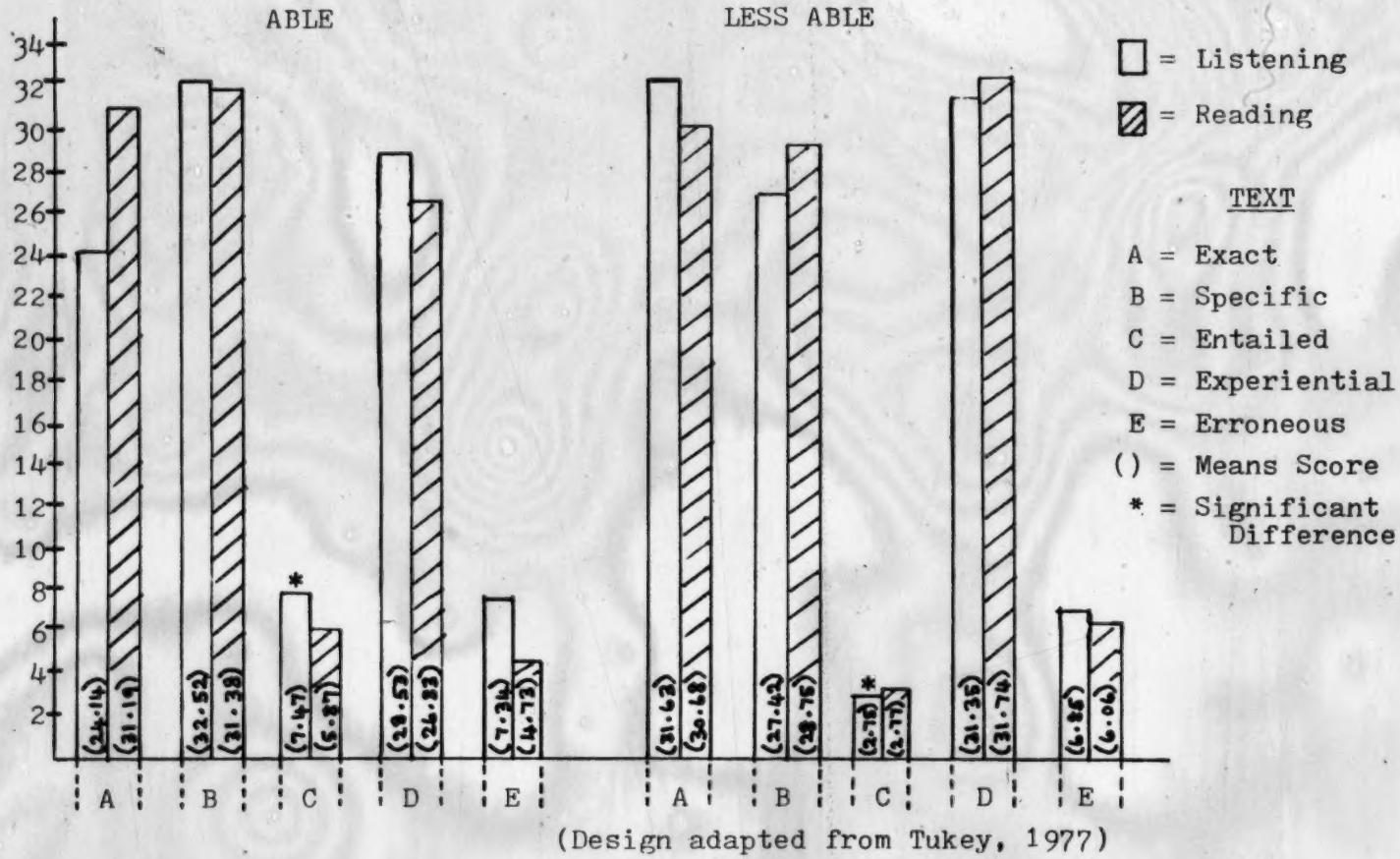
Figure 9

Text Erroneous Comprehension Category for Protocol Analysis

Overview of the Findings Related to Hypotheses One and Two

The assignment of comprehension categories to recall protocols allows the researcher to examine how specific input is processed. Fagan's Comprehension categories for protocol analysis (Fagan, in press) grant partial access to what occurs in the processor's mind as the processing tasks unfold. Moreover, they reflect the distribution across which the processor recalls verbatim details (Text Exact), information containing specific textual reference (Text Specific), synthesized or summarized information (Text Entailed), input enhanced by/combined with prior knowledge (Text Experiential), and incorrectly processed information (Text Erroneous), as illustrated in Figure 10. The latter offers a visual framework within which the cognitive processing strategies of fourth grade able and less able readers engaged in tasks of receptive language comprehension may be observed, indirectly. Examination of the parts in their relationship to the whole information processing framework, according to the statistical analyses, allows the researcher to form inferences regarding any patterns which may have evolved from the juxtaposed findings.

A visual scan of Figure 10 data reveals that both groups of children focus processing strategies upon verbatim input (i.e. Text Exact), specific details from the input (i.e. Text Specific), and upon relating prior knowledge with specific units of the author's message (i.e. Text Experiential). Relatively speaking, neither group shows a distinct tendency



(Design adapted from Tukey, 1977)

Figure 10

Summary of Processes Engaged by Able and Less Able Groups

(expressed as percentages of the total information recalled within each task)

to synthesize or summarize incoming details (i.e. Text Entailed), nor is overall groups' processing excessively erroneous (i.e. Text Erroneous); the latter factor possibly being due to the processing of instructional level materials. The less able readers demonstrate highly similar processing strategies within each discrete comprehension category, for both reading and listening comprehension tasks. The only statistically significant difference emerging lies within the syntheses and summaries (i.e. Text Entailed recall) of able and less able readers for the task of listening comprehension; the able readers producing more than the less able readers at the P .05 level of significance. Although it would be of interest to compare how the distribution of comprehension categories for the sample aligns with that examined in other studies, extended research of that nature exceeds the parameters of the current thesis as predetermined by the author, and must needs be held in abeyance for future research endeavours.

Summary

Instructional level performances of able and less able fourth grade readers were established for reading and listening comprehension, using Forms A and B respectively of the Standard Reading Inventory (McCracken, 1966). Instructional level recall protocols for both tasks were analyzed according to Fagan's Comprehension categories for protocol analysis (Fagan, in press).

Findings related to Hypothesis One, parts A and B,

indicated that the performance levels of able readers were significantly greater than those of less able readers for both tasks, and by equal amounts, and that performance in listening comprehension was significantly greater than performance in reading comprehension for both groups. Discussion centred largely upon possible developmental and general language comprehension factors as viable explanations of the research findings.

Findings related to Hypothesis Two, parts A through E, suggested that fourth grade students processed instructional level tasks of reading and listening comprehension in a largely similar manner regardless of mode of input, and that able and less able readers engaged very similar cognitive processing strategies during fulfilment of task requirements. A significant difference in the amount of summaries and syntheses produced by able readers during the task of listening comprehension was demonstrated. Discussion focused upon the heightened engagement of reconstructive processing strategies by able readers during the listening task, and particularly upon the organizational processing strategy reflected in the production of summaries and syntheses. More detailed observations regarding the findings are discussed and summarized in the following chapter.

CHAPTER V

MAJOR FINDINGS, SUMMARY OF DISCUSSION, CONCLUSIONS, AND IMPLICATIONS

Summary of the Study

The purposes of this study were to ascertain whether unitary thought processes were commonly engaged during tasks of reading and listening comprehension, and to determine whether fourth grade able and less able readers processed instructional level tasks of receptive language comprehension in a similar manner.

The sample of forty children was drawn from the fourth grade population of four elementary schools in the County of Parkland No. 31 near Edmonton, Alberta. Children were selected on the basis of their performances on the non-verbal section of the Canadian Cognitive Abilities Test, Level B, Form 1 (1974), and the comprehension subtest of the Gates-MacGinitie Reading Test, Level D, Form 2 (1978). Performance scores on the latter determined the assignment of children to able or less able readers' groups. Each of the two groups consisted of ten boys and ten girls.

Children were assessed individually to establish instructional level performances in (a) silent reading comprehension, and (b) listening comprehension. Each child read and listened to short graded passages of prose and was

asked to provide a verbal recall of passage information as soon as each task was completed. Questions were asked, following each passage recall, to elicit comprehension of information not recalled spontaneously. The unaided verbal recalls were tape recorded for subsequent transcription and analysis. Every instructional level recall protocol was divided into clausal units and comprehension categories were assigned to each unit.

Statistical analyses of the data consisted of a two-way analysis of variance on instructional level performances, a two-way analysis of variance with repeated measures on the comprehension categories, and t-tests to clarify a significant difference obtained for one of the five comprehension categories.

Discussion of Major Findings

Although preliminary discussion followed each of the findings in Chapter IV, an analysis of major inter- and intra-groups' findings would seem productive prior to a concluding synthesis.

Processing Strategies of Able Readers

Across the findings related to Hypotheses Two A through E a distinct pattern emerged regarding the processing strategies engaged by able readers, when comparison was made between performances in reading and listening comprehension. When listening to passages of prose presented at instructional level, able readers tended to become less

constrained by the exact wording of the input (i.e. less production of Text Exact information) and to employ more reconstructive processing strategies (i.e. Text: Specific, Entailed, Experiential, and Erroneous), when interacting with the author's message. Table Fourteen provides a comparison of means scores for each comprehension category and for both receptive language comprehension tasks:

Table Fourteen

Percentaged Means Scores for Able Readers on Tasks of Reading and Listening Comprehension

Variables	Reading	Means (Difference)	Listening	
Text Exact	31.19	(7.05)	24.14	
Text Specific	31.38	(1.14)	32.52	Reconstructive processing
Text Entailed	5.87	(1.60)	7.47	
Text Experiential	26.83	(1.70)	28.53	
Text Erroneous	4.73	(2.61)	7.34	

The difference between the reading and listening means for the Text Exact category (7.05) is inversely equal to the sum of the means' differences for the remaining categories (1.14 + 1.60 + 1.70 + 2.61 = 7.05 respectively). Observation of the discrete differences for the reconstructive strategies reveals that no single category emerges definitively to counterbalance the effect demonstrated for Text Exact recall. However, the 2.61 difference between reading and listening

means for the Text Erroneous category signals a possible trend towards the increased production of inaccurately processed information as able readers become less constrained by the precise wording of narrated information. Moreover the slight increase in production of summaries and syntheses (Text Entailed category) in the listening condition suggests that able readers attempt to process for the gist of the message as the narrative unfolds. Whilst reading, the processor has constant access to the text, may regress to check specific details, and hence monitor for accuracy on an ongoing basis if necessary. Such is not the case whilst listening, where the nature of the input demands relatively simultaneous processing of interrelationships between characters and events. Subsequent monitoring for specific detail within the overall gist of the passage is highly dependent upon the accuracy of the listener's ongoing processing as the passage is narrated. If able readers indeed attempt to extract the gist of a narrated passage, then textual constraint lessens and the potential for erroneous processing is heightened. Attempts to fill in informational gaps may result in faulty inferencing, summarizing and synthesizing (Text Erroneous).

The writer acknowledges that the above discussion is largely speculative and based solely on inferred trends. Had the sample been larger it is possible that the observable trends would have been more definitive. In summary, then, able readers appear to become less constrained by narrated input and to engage in more reconstructive processing when

listening to, as opposed to reading, a passage of prose.

Processing Strategies of Less Able Readers

Less able readers engaged highly similar processing strategies during both tasks of receptive language comprehension, as evidenced by within-category reading and listening profiles illustrated in Figure 10. As stated previously, they compared favourably with able readers in the production of Text Exact, Text Specific, and Text Experiential information and showed no tendency towards the excessively erroneous processing of instructional level input. Although the production of Text Entailed information following reading comprehension was similar in amount for both groups, the less able readers' production of Text Entailed information following listening comprehension was significantly less than that of their able peers.

The production of summaries and syntheses, reflected in the Text Entailed category, implies that the processor is using organizational strategies in order to impose a cohesive structure on interrelated units of the author's message. Hence it may be suggested that less able readers are less able to cope with the transient nature of narrated prose than are able readers, where the encapsulating of interwoven relationships is concerned. It is conceivable that their comprehension of discrete but ultimately related units of incoming information decays before the interrelationships are firmly established. If such is the case, then the significant difference obtained between able and less able

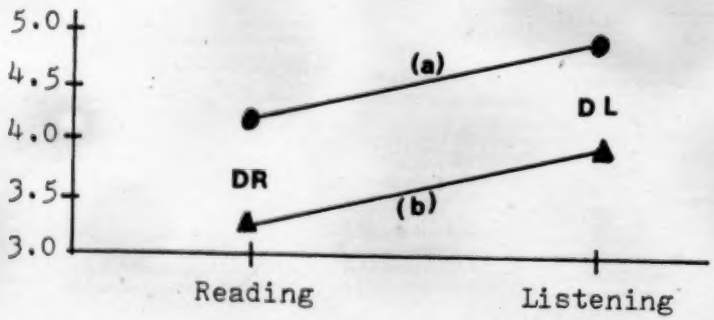
readers in the amount of Text Entailed information produced following listening comprehension may indicate that less able readers are less likely to use spontaneous organizational strategies than are able readers; and particularly so in the listening situation which allows no regressive monitoring of salient details.

Instructional Level Performances of Able and Less Able Readers

The current findings indicate that able readers' performances on tasks of reading and listening comprehension exceed those of less able readers, to a significant degree, and that performance in listening comprehension is significantly greater than performance in reading comprehension for both groups of children; factors which support the findings of previous research (Smiley et al, 1977; Sticht et al, 1974). Moreover, performance in listening comprehension exceeds performance in reading comprehension by equal amounts, between the two groups and for each task, as noted in previous research by Berger (1975), Berger and Perfetti (1977), Smiley et al (1977), Sticht (1972), Sticht et al (1974), and Weisberg (1979). Berger and Perfetti (1977) explain the equal differences factor in terms of less able readers' reduced ability to comprehend language. Sticht et al (1974) view the differences in terms of a developmental continuum, i.e. with able readers being developmentally ahead of less able readers with regards to processing ability in general, and with listening performances exceeding reading performances for both groups since the

decoding variable pertinent to reading is not a variable for the listening situation. Figure 11 may help to clarify those explanations, and will provide a framework from which further possibilities may be advanced.

Grade Means Scores for Able and Less Able Readers



● = Able Readers: (Reading 4.200; Listening 4.950)
▲ = Less Able Readers: (Reading 3.225; Listening 3.925)
DR = Difference between able/less able means scores for reading
DL = Difference between able/less able means scores for listening
(a) = Difference between reading/listening performances for able readers
(b) = Difference between reading/listening performances for less able readers

Figure 11

Instructional Level Performances
in Reading and Listening Comprehension

With the exception of able readers producing a significantly greater number of summaries and syntheses than less able readers, in the listening treatment, both groups processed instructional level materials in a similar manner regardless of mode of input. However, able readers have the ability to process more complex information than do less able

readers, as evidenced in instructional performance levels. The researcher must question (1) what factor, or combination of factors, leads the able readers towards more competent performance in receptive language comprehension than less able readers, and (2) why listening performance tends to exceed reading performance at the elementary school level.

(1) Competent Receptive Language Comprehension

The general language comprehension factor raised by Berger and Perfetti (1977) lies within the superordinate framework of what Thorndike (1917) terms "thinking". Moreover a central tenet of this thesis is that cognition and language are complexly intertwined as the corner-stones of comprehension, thus the argument that less able readers understand language to a lesser degree than able readers merits close attention. The question regarding what constitutes competent language comprehension may be answered tentatively. In terms of meeting the expected standards set regarding age and grade placement levels, the competent language processor understands the meaning of specific words in relation to others within a shared context. He brings his combined world and linguistic knowledge to bear as he interacts with the incoming message, going beyond the surface structure of the message to comprehend relationships that are implicit but not explicitly stated. In so doing, he engages appropriate cognitive processing strategies to achieve effective comprehension.

In the present study both able and less able readers

use largely similar processing strategies during tasks of receptive language comprehension. Age differences are not significant and, although there is a $P < .05$ difference in non-verbal I.Q. between groups, groups' means place within the average range of intellectual functioning. Two differences between groups emerge; both of which may be viewed within Berger and Perfetti's (1977) general language comprehension theory. Those differences lie (1) in the performance levels attained for both tasks, and specifically in the equal amounts of difference factor (c.f. Figure 11, DR and DL), and (2) in the significantly higher production of summaries and syntheses by able readers during the listening task, with a possible trend being noted similarly during the reading task (c.f. Table Twelve). Berger and Perfetti's (1977) research findings indicate:

> ... (a) that reading comprehension and listening comprehension depend on the same general language processing skills and that (b) localized processing skills, i.e. encoding more immediate language units within a single sentence , rather than global organizational skills, i.e. organizing and integrating larger language units into meaningful relationships, are a major source of individual difference in language processing. (Berger and Perfetti, 1977, p. 7)

Berger and Perfetti's explanation of the "equal amounts" factor (1977) results in their conclusion for (a) above. However, their statement regarding "a major source of individual difference in language processing" is diametrically opposite to the suggestion advanced by the writer with respect to less able readers' organizational strategies when listening, i.e. that less able readers are able to encode immediate language units during processing,

but that their comprehension of those discrete units may decay prior to confirmation of potential interrelationships. It should be noted that Berger and Perfetti's (1977) less able readers, with a mean reading comprehension performance level of 2.62, were required to process input presented at least one grade level above their current instructional level mean. Hence many of them were processing at frustration level. Alternatively the able readers, with a mean reading comprehension performance level of 5.05, were processing either at instructional or independent levels. Within this framework, therefore, it is hardly surprising that inter-group differences emerged with the processing of "immediate language units". Largely frustration level processing by less able readers must similarly be implicated in the research findings of Smiley et al (1977) which were in accordance with those of Berger and Perfetti (1977), having used similar techniques for selecting the sample and the level of materials to be processed. It is clear, however, that some aspect of general language comprehension is at least partly responsible for less able readers' deflated performance levels. The extent to which such a suggestion is viable remains tentative at the present time.

From the developmental theorists' point of view the general language comprehension factor and the ability to decode graphic symbols may both be implicated in receptive language comprehension competency, although not necessarily to the same degree:

> ... the person comes into the world with certain basic adaptive processes which he uses to build a cognitive content and to acquire language competency. The bulk of this competency is verbal language competency, acquired and expressed by auding and speaking, respectively. In learning to read, the child uses the same cognitive content and languaging competencies used earlier in auding, plus the additional competencies involved in decoding print-to-language. (Sticht et al, 1974, p. 114)

The authors hasten to explain (p. 116) that excellent decoding skills, alone, do not ensure adequate comprehension since the adept decoder may be limited in terms of vocabulary, knowledge, and thinking processes. However Sticht (1972) proposes, "... one should be able to comprehend equally well by listening or by reading, if one has been taught to decode well and other task variables are equalized" (p. 294). Thus far, then, the superior performance of able readers may be explicable in terms of both a generally heightened ability to comprehend language whether reading or listening, and efficient decoding skills in the reading situation. There are additional explanations which may offer some insight into the deflated performance levels of less able readers.

Torgesen's suggestions with regards to processing differences between learning disabled children and children who appear to learn effectively merit attention. Although the less able readers in the present study are not, by definition, learning disabled, nevertheless their deflated receptive language comprehension performance levels may be characteristic of the performance levels attained within the so-called learning disabled population; hence some comparison is viable. Torgesen (1980) suggests that at least three

major factors arising from research findings may be implicated for some children's "failure to use active, organized strategies as consistently as children who learn normally" (p. 23), thus resulting in deflated performance. The key word used by Torgesen is "consistently", since the findings of the present study indicate the use of largely similar strategies at instructional levels. It may be assumed that whereas strategies are engaged effectively for instructional level processing, a breakdown of strategies occurs with frustration level processing. One of Torgesen's factors consists of "basic capacity limitations or a lack of a sufficient knowledge base for sophisticated verbal-language processing" (p. 24). However, the raising of performance levels in reading comprehension following instruction in the engagement of task-appropriate strategies (Brailsford, 1981) negates both basic capacity and knowledge base limitations for some children classified as learning disabled readers. The second factor reported by Torgesen (1980) suggests that less able processors exhibit a slower rate of developmental maturity than able processors, a factor which allies with the research of Sticht et al (1974). However, Torgesen adds the viable dimension that children who are slow to mature require extended periods of time in which to consolidate tentatively acquired skills, thus enabling the strategic application of those skills to become firmly established. Certainly children who are required to process grade placement level materials on a regular basis, when those children are thus processing at personal

frustration levels, are unlikely to develop or consolidate appropriate processing strategies. Torgesen's third factor is an indication that some children may be unaware that they need to participate actively in the teaching-learning process; i.e. that their inherent ability remains untapped to some extent because of their passive learning stance (p. 24); children such as these are highly likely to demonstrate the use of less organizational strategies than their more able peers who tend to be active information processors. Torgesen's factors may be discrete or overlapping variables in explaining the low performance levels of some children. Moreover, Torgesen explores a further variable which may serve to complicate all of the factor possibilities noted in this chapter to date, i.e. that early failure in academic tasks may lead to a child's reluctance to participate wholeheartedly in subsequent tasks of similar nature, hence initial failure rapidly compounds into continuing failure (Torgesen, 1977; 1980). The affective domain is surely implicated in all facets of theories regarding the performance levels attained by the human information processor.

Doubtless, there are infinite possibilities concerning explanations as to why some children are able to achieve higher receptive language comprehension performance levels than others of comparable intelligence and chronological age. Those noted in the present study concern general language comprehension with specific reference to organizational processing factors, the child's developmental "readiness" in terms of grade placement requirements, current basic

capacity and knowledge base limitations, the diverse time-spans required by individual children for acquiring / consolidating / and strategically applying learned skills prior to processing input of increased complexity, knowledge that active participation may enhance learning potential dramatically, and positive self-concept related to ongoing progress. It is highly likely that a large degree of overlap exists between factors. It is equally possible that some factors are more clearly implicated than others with respect to the performance levels attained by individual children. A review of the findings of the present study suggests, to the writer, that the multi-variate factors presented may be interrelated to such an extent that all are implicated, to some degree, in the performance levels attained by the sample population. However, the variable of organizational processing strategies demonstrated to a significantly greater extent by able readers than less able readers, within the context of the listening task, may prove to be the most decisive factor in differentiating between able and less able information processors.

(2) Listening Performance Exceeding Reading Performance

The findings of an expanding body of research indicate that performance in listening comprehension tends to exceed performance in reading comprehension at the elementary school level (Berger and Perfetti, 1977; Smiley et al, 1977; Sticht, 1972; Sticht et al, 1974; Weisberg, 1979). The findings of the present study ally with those noted above (c.f. Figure 11,

(a) and (b)). Thus, subsequent related studies may hypothesize with increasing conviction that listening performance will exceed reading performance across elementary school ability ranges. However the question regarding why listening performance, at this level, tends to be superior to reading performance requires further consideration. Sticht et al (1974), speaking from the developmental theorists' standpoint, view learning by reading as a natural extension of learning by listening. Up to the point of school entry the young child's accumulated store of knowledge has resulted from his assimilation and accommodation of every experience with which he has interacted. Thus, on entering school he has had considerable practice in learning by listening. To be sure, many of his meaningful "facts" have been acquired through combined auditory and visual processing of external stimuli but, on beginning school, exposure to the graphic symbols which unite to produce meaningful written discourse opens new information processing horizons for the grade one child. It is reasonable to assume that a child's comprehension of incoming information will, at this stage, be more efficient when listening to rather than attempting to read the input. It is also reasonable to assume that once the child achieves automaticity in phonological coding, and hence processes print at a rate rapid enough to ensure that comprehension of inter- and intra-sentential relationships does not decay (Berger and Perfetti, 1977), performances in reading and listening comprehension might be expected to equalize. Sticht et al (1974) report that such tends to be

the case as "languaging" by listening and reading appear to become "... equally effective sometime around the seventh or eighth grades" (p. 114). Moreover, additional research indicates that the latter occurs when skill in reading "... is developed beyond the learning-to-decode stage ..." and the child's

> ... maximal rate of silent reading with accurate retention corresponds closely to maximal rates of speaking and auding, with 250-300 words per minute representing a best rough estimate of the optimal rates for these processes. (p. 115)

It is of some interest to note that when a, presumably, able reader reaches Sticht et al's (1974) noted grade eight level, his interactive processing of incoming information spans fourteen years of listening and eight years of reading. It may be supposed that the formal emphasis on reading instruction during the elementary grades contributes greatly to the tendency towards equalization of performance levels in receptive language comprehension. No mention is made with respect to the grade level at which reading and listening comprehension performance levels equalize in the case of less able readers. It may be assumed, within the developmental model's framework, that such equalization may be expected to occur, albeit at a rate much slower than that required by able readers and given that school attendance remains constant. Sticht et al's review of related research (1974) extends beyond school leaving age to encompass high school graduates. It was found that, at the college and adult levels, reading performance tends to exceed listening performance for approximately half of the assessed

population. Sticht et al suggest that the enhancement of reading performance at this level

> ... represents improved skill in extracting information from the stable visual display of print, rather than indicating an ability to comprehend some material by print that cannot be comprehended by auding. (1974, p. 83)

Thus, the findings of the present study, with respect to the mean performance levels attained by able and less able readers on tasks of reading and listening comprehension (c.f. Figure 11), may be observed within the parameters of the preceding discussions as follows:

1. Inter-group differences between receptive language comprehension performance levels (Figure 11, DR and DL) may be explicable in terms of developmental and/or general language comprehension factors, with specific reference in the latter to organizational strategies.
2. Intra-group differences between performances in listening and reading comprehension at the elementary school level (Figure 11, (a) and (b)) may occur due to the extensive practice effect afforded by years spent in thinking (Thorndike, 1917) about auditorially processed information, in conjunction with the factor that lack of the decoding variable permits processing of more complex materials.

Summary of Major Findings and Conclusions

The instructional level performances of able and less able readers on tasks of reading and listening comprehension were compared in order to determine (a) whether able

readers' performance levels on both tasks were significantly greater than those of less able readers, and (b) whether the fourth grade students' performance in listening comprehension was significantly greater than in reading comprehension. Analysis revealed that able readers' performance levels on both tasks were significantly greater than those of less able readers, and that overall performance in listening comprehension exceeded performance in reading comprehension to a significant degree. It was concluded, therefore, that the receptive language comprehension of able readers is superior to that of less able readers, and that fourth grade children can understand more complex prose when listening than when reading.

Analysis of the processing strategies used by able and less able readers during instructional level tasks of receptive language comprehension demonstrated that there were no significant differences in the manner in which both groups processed instructional level tasks of reading comprehension. Both groups processed instructional level tasks of listening comprehension in a comparatively similar manner, although a significant difference was obtained in the greater amount of summaries and syntheses produced by able readers. When processing instructional level tasks of receptive language comprehension fourth grade children recall some passage information in verbatim form but, on the whole, they tend to reconstruct the author's message prior to verbal recall. Able readers in particular demonstrate a tendency towards increased reconstructive processing when listening

rather than reading, becoming less constrained by verbatim details and hence risking increased possibility for error.

A more global conclusion emerges from the current findings. In many classrooms reading and listening comprehension have tended to be viewed as relatively discrete academic areas, despite recommendations to the contrary in Alberta's Elementary Language Arts Curriculum Guide (1978). Comparative research has focused largely on inter-modality performance level differences with minimal discussion regarding how those levels are achieved. Only in the area of reading research has attention focused upon the nature of cognitive activities engaged during tasks of comprehension. Hence there is an expanding awareness regarding how children process print but, to the knowledge of the writer, no previous research has examined the processing strategies engaged for the comprehension of narrated prose, within the parameters of an information processing model. Since the present findings indicate that fourth grade children use largely similar processing strategies for both receptive language comprehension tasks, it can be concluded that unitary thought processes are common to both tasks; thus "thinking" itself becomes of paramount importance and mode of input becomes a secondary, albeit substantial, concern.

Classroom Implications Emerging from the Study

A major implication concerns the finding that less able readers demonstrate competent processing ability when working with instructional level materials, i.e. an ability to reason

out relatively complex relationships in a manner very like that of able readers processing grade placement level materials. When less able readers process frustration level materials consistently they face a triple dilemma. Firstly, the chances that they will understand the contents are minimal. Lack of initial comprehension can detract radically from cumulative learning, hence its effect tends to magnify throughout the year and intrudes into subsequent years of schooling. Secondly, according to Torgesen (1980), less able readers require more time than their able counterparts during which to consolidate newly acquired strategies. Task failure would undoubtedly result if extended periods of practice time were not provided to give the opportunity for the development of automaticity, wherein appropriate cognitive processing strategies may be engaged spontaneously. Finally, the child who rarely experiences academic success, and thus a sense of personal achievement, is in grave danger of developing a lowered self-concept and may withdraw from active participation in the learning process (Torgesen, 1977; 1980). The three prongs of the dilemma are interrelated and their combined effect may result in retroactive consequences. Hence an implication of considerable magnitude is that less able readers must be provided with independent and instructional level reading materials to ensure the engagement of appropriate processing strategies and, thus, satisfactory progress.

The reconstructive organizational strategies required for synthesizing and summarizing incoming information are

used more extensively, as evidenced by listening processing results in this study, by able readers than less able readers, and to good effect. A child who is able to combine explicitly stated and implicitly derived information in order to understand the gist of an incoming message demonstrates a relatively high degree of processing competence. Thus, another implication arising from the study concerns continued classroom instruction in extrapolating major themes and relationships between characters, places, and events rather than focusing on less essential details during tasks of receptive language comprehension. The implication that sound organizational processing abilities play an important role in effective general language comprehension merits considerable attention within the classroom learning environment.

A central finding of the study confirmed that fourth grade children process more complex language appropriately when listening to, rather than reading, passages of prose. Moreover Sticht et al's (1974) review of related research suggests that this finding tends to be applicable to students throughout the elementary school years. There is, hence, increased reason to suppose that a substantial amount of knowledge is acquired through the auditory processing channel; that information currently too complex to be dealt with in print may be communicated within a listening framework; and that auditorially processed information may serve as an advance organizer prior to the processing of related details in print, thus enhancing subsequent performance.

The implications for facilitating learning are of paramount importance across all age and ability ranges and specifically with regards to pre-school children in extending knowledge and linguistic bases, grade one children in establishing a firm concept of story schema and encouraging active participation in the learning process during initial and ongoing stages of beginning reading instruction, and less able readers in facilitating interactive cognitive processing of non-print materials prior to processing print. In both informal and formal contexts, the possibilities for augmenting learning within a listening framework are diverse and infinite.

The conclusion that effective reading and listening comprehension depend upon underlying thought processes common to both tasks has direct application in all settings relevant to the human information processor. Within the school environment the implications are crucial. The "stamping on of knowledge" (Ashton-Warner, 1963) is a necessary but by no means sufficient condition to ensure that learning takes place. Children need time to think about each of the vast array of learning experiences to which they are exposed daily. They need ample opportunity to discuss, reason, and philosophize; to interact with incoming information to the point where they understand their own processing capabilities and are able to engage, deliberately, processing strategies appropriate to the task in hand (Brown, 1975). Brailsford's work in training the activation of task-appropriate strategies on non-print

tasks (1981) led to enhanced reasoning ability, as reflected in increased performance levels on tasks of reading comprehension, and qualitative improvement trends in strategic processing for a group of learning disabled children. Verbal mediation was a central focus in the training program, wherein children were encouraged to discuss why a specific strategy effected the best results for them, relative to a particular task; what strategies might be more effective; why certain strategies had not achieved anticipated results. It may be suggested that, since unitary and encompassing thought processes are deeply implicated in the quality of ensuing receptive language comprehension, early intervention and remedial programs in strategy training might be beneficial for some children.

Suggestions for Further Research

This study did not examine possible developmental processing differences between children of varied chronological age. Future research could observe children across the elementary school range, beginning at the grade two level where cognitive processing strategies might be expected to have reached some degree of automaticity within the reading framework, and extend to encompass grade twelve students. However, obvious methodological problems emerge concerning (a) selection of a testing instrument with alternate and equivalent forms to contain the sample's range of instructional level performances without exceeding the test's floor and ceiling, and hence (b) the obtaining of

sufficient second grade less able readers (i.e. floor effect), and sufficient able readers at the grade twelve level (i.e. ceiling effect), to constitute a statistically viable sample.

Further consideration of developmental factors could be effected by updated assessments of the current sample at yearly intervals. Possible inter- and intra-group similarities and differences across time could be mapped and analyzed; an aspect which is especially interesting in terms of the "equal amounts" factor noted between able and less able readers for both tasks of receptive language comprehension. Again problems arise due to the ceiling effect of the measuring instrument, and especially so within the listening treatment; a certain amount of attrition regarding sample size might be expected as families relocate, resulting in uneven data bases. A viable alternative to the potentially unwieldy problem might consist of modifying the original design to accommodate performance levels and processing strategies of individual students within a case studies' format.

In terms of the original sample it would be interesting to analyze frustration level recall protocols for both tasks in order to determine (a) whether a breakdown of strategic processing is similar for both tasks, as reflected in the comprehension categories, (b) whether the reflected breakdown occurs across the five categories or within discrete categories, and (c) whether the breakdown of strategies is similar for able and less able readers across both tasks. Kavanagh's reading research study of processing differences

(1981) indicates that similar strategies' profiles are obtained for independent and instructional level recall tasks, with the most extreme inter-group differences being demonstrated at frustration level. A comparative study of the breakdown of strategic processing during both tasks of receptive language comprehension would be of interest on two counts, i.e. if similar effects are found for both groups it may be suggested that (a) there is additional foundation for the hypothesis that unitary thought processes are common to both tasks, and (b) the general language comprehension processing abilities of both groups contain more similarities than differences. Moreover, a logical extension of the current suggestion for future research might include a comparison between the reading treatment findings of the present study and those previously emerging from the field of reading.

Within the general language comprehension framework the able readers' production of syntheses and summaries, significant for listening and demonstrated as a trend for reading, merits additional research. It may be suggested that more definitive findings with respect to the reading treatment might be obtained with larger numbers of children in the sample. Should the significant difference in the listening treatment be replicated and the trend in the reading treatment obtain significant differences, for able readers, then it may be reasonable to assume that organizational ability is a discriminating factor with respect to inter-group differences in performance level.

The current study observed children processing passages of prose written in narrative format. Future research might examine how comparable groups of children process expository passages. Of major interest would be the findings related to a research question regarding whether increased factual input results in greater textual constraint and less reconstructive processing than is demonstrated in the narrative mode.

Concluding Statement

> The tools of learning ... are essentially ... the skills in using language as a means of examining the detail, the relationships and the structure of the world around us . They are the skills of logical argument, of examining a range of possible solutions to problems, of anticipating and planning, and of framing questions which will bring the kind of information required. These are the tools of thinking ... (Tough, 1973, p. 126)

The findings of this study suggest that, when fourth grade able and less able readers process instructional level tasks of receptive language comprehension, the thought processes engaged by both groups are, by and large, very similar. The "tools of thinking" are, therefore, available in like degree for both groups of children when incoming information dovetails with current, individual processing capabilities in terms of semantic and syntactic complexity. An overriding assumption that emerges from the findings is that equal educational opportunity for all children may become a reality when educational programs are modified to accommodate individual children's needs. Moreover, as

similar underlying processes appear to be accessed on both the reading and listening comprehension tasks, then the teaching of integrated thinking strategies should be embedded within all language arts programs. Thus, our teaching focus should consider both appropriate individualized instruction for each child and holistic learning strategies that may be generalized to all areas of the curriculum.

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APPENDIX A

Exclusions from the Study

Children Ineligible for Inclusion in the Sample (Post-Screening)

Total Population	210
Eligible for Inclusion	102
Ineligible for Inclusion	108

Breakdown of Criteria for Non-Eligibility

Reading comprehension percentile ranks between 35 and 72	64
Ibid, plus below a non-verbal I.Q. of 85	4
Ibid, plus below a non-verbal I.Q. of 85 and having repeated a grade	3
Ibid, plus having repeated a grade	10
Ibid, plus exclusion on the hearing impairment factor	2
Non-verbal I.Q. lower than 85	5
Ibid, plus having repeated a grade	7
Ibid, plus exclusion on the behavioural factor	1
Ineligible due to having repeated a grade	10
Ineligible due to the hearing impairment factor	1
Ineligible due to the second language factor	1
N.B. No visually impaired children in screened population	0
Total Non-Eligible:	108

APPENDIX B

The Tests

The Gates-MacGinitie Reading Test

A sample passage and accompanying questions are presented as follows:

The lion is often called "King of the Jungle", but most lions live on grassy plains. They usually live in small groups called prides. The female lions do most of the hunting for the males and cubs in the pride.

1. Where do most lions live?

   A. in forests
   B. in grasslands
   C. in jungles
   D. in deserts

2. Which lions do the most hunting?

   A. cubs
   B. kings
   C. females
   D. young males

(Passage one, Level D, Form 2)

The Standard Reading Inventory

A sample reading comprehension passage, with probe (aided) questions, reads as follows:

The Little Beaver (149 words)

The hooting of the horned owl was well known to the orphan beaver. It meant no danger to him until one night when he was swimming across an open pool. Out of the night came a silent shadow. The beaver dived as the owl struck. He escaped except for a small cut in his tail.

Later he met the dogs. He had heard them many times. He knew their smell, so these signs did not alarm him. One night he went farther than usual in search of new greens. Two dogs running silently along the side of a hill began barking when they saw the beaver. He headed for the water, but the dogs cut him off.

The stillness was broken by a tumbling howling tangle of beaver and dogs. His heavy coat protected him, and his sharp teeth fought off the dogs long enough for him to escape.

__ 1. What sound was he used to hearing?

__ 2. What was the beaver doing one night?

__ 3. What happened that night? (What did the owl do?)

__ 4. What happened to the beaver?

__ 5. Why didn't the dogs frighten the beaver?

__ 6. Why was he out on land one night?

__ 7. What did the dogs do when they saw the beaver?

__ 8. What did the beaver try to do?

__ 9. What happened?

__ 10. What saved the beaver?

Comprehension unaided _____ Total (unaided and aided) _____

(4th Grade passage, Form A)

The Standard Reading Inventory

A sample listening comprehension passage, with probe (aided) questions, was narrated as follows:

Turtle Eggs (149 words)

Horseshoe Bend is a long shallow pond about a half mile from my home. Two old turtles are among its many inhabitants. They have lived in the pond for many years. No one knows how long.

Every year in June the female snapping turtle leaves the water and takes a short journey. She hunts for a good place to lay her eggs. A turtle likes a sunny spot in sandy soil where there is good drainage. There the eggs will be hatched by the heat from the sun's rays.

When the turtle finds such a place she digs a hole about five inches deep. In it she lays twenty to forty eggs. The eggs are white and round as marbles. They are about one inch thick. When the eggs are all in the hole she covers them carefully and returns to the water without further thought of the eggs.

__ 1. What is Horseshoe Bend?

__ 2. Who lived there? (What else?)

__ 3. How long had the turtles lived there?

__ 4. What does the female turtle do every year?

__ 5. What kind of place does she want?

__ 6. How are the eggs hatched?

__ 7. Where does a turtle lay her eggs?

__ 8. How many does she lay?

__ 9. Describe the eggs.

__ 10. What does the turtle do after laying the eggs?

Comprehension unaided _____ Total (unaided and aided) _____

(4th Grade passage, Form B)

APPENDIX C

Comprehension Categories for Protocol Analysis

Sample of an Analyzed Recall Protocol (Reading Comprehension)

The Little Beaver

(1) there was D this owl / (2) that always D would hoot / (3) but it B would never alarm him / (4) and one night (he) E when he was on land / (5) he heard E this noise / (6) and he dived D into the water / (7) and then he escaped except for a (a) B scratch on his tail / (8) and then the next night he went out in B a little farther to get greens / (9) and D wood / (10) and (um) he knew the smell B of these dogs / (11) and then they B started barking / (12) and then he started D running for the water / (13) but (they) the dogs A cut him off / (14) and his fur B protected him D enough / ... (15) fought off the dogs with B his sharp teeth / (16) and he got away D into the water

Clauses: 16

Recall Categories*:		
	A - Text Exact	1 (5.88)
	B - Text Specific	7(41.18)
	C - Text Entailed	0 (0.00)
	D - Text Experiential	7(41.18)
	E - Text Erroneous	2(11.76)
		17 (100%)

* Some clauses may be assigned more than one category.

Sample of an Analyzed Recall Protocol

(Listening Comprehension)

Turtle Eggs

(well) (1) the man on there[D] knew two turtles / (2) and she'd go[A] on a journey / (3) and dig up[B] a hole / (4) and lay twenty to forty[A] eggs / (5) and they're white[B] / (6) and round as a marble[B] / (7) and then she'd[B] go back into the water

Clauses: 7

Recall Categories:			
	A - Text Exact	2	(28.57)
	B - Text Specific	4	(57.14)
	C - Text Entailed	0	(00.00)
	D - Text Experiential	1	(14.29)
	E - Text Erroneous	0	(00.00)
		7	(100%)

COMPREHENSION CATEGORIES FOR PROTOCOL ANALYSIS

William T. Fagan

The University of Alberta

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The remainder of the paper may be referenced as:

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COMPREHENSION CATEGORIES FOR PROTOCOL ANALYSIS

Most reading educators would agree that the ultimate goal of reading is to comprehend the author's message. It is also most likely that comprehension is the most unwieldy aspect of reading to be taught or assessed.

Assessing Comprehension

Comprehension has most frequently been assessed through questions and most often of a literal nature (Guzak, 1967). Other test forms such as the multiple-choice, true-false, cloze, and sentence-verification have also been used to assess comprehension. Another popular way has been through recall - that is, the reader recalls as much information as possible from what has been read. Whereas the latter allows the reader more leeway in organizing and reorganizing his input and integrating it with prior knowledge, the recall presents problems for analysis of how much comprehension is involved.

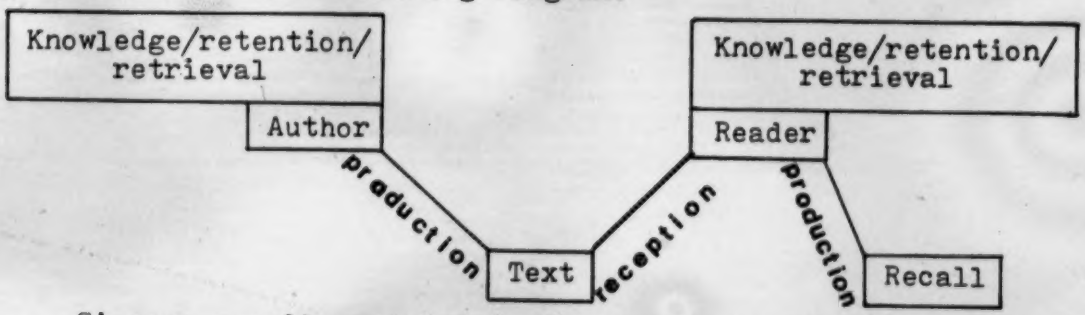
A reader's recall as interpreted by a researcher or educator is usually assessed in terms of the degree to which it corresponds to the author's meaning as expressed via a text. The author's meaning is also explicated through the researcher/educator's interpretation. Perhaps four movements best summarize how recalls are analyzed for this purpose. Kintsch and colleagues formulated the "proposition", and with it as a base unit were able to construct an elaborate semantic coherence network of the text and recalls (Kintsch and Keenan, 1973; Kintsch and VanDijk, 1978). Along similar lines, though with different base units and different text relations were the story grammar advocates (Mandler and Johnson, 1977; Stein, 1978). The third movement is perhaps best represented by Fredericksen (1975a, b) who proposed a framework of relationships that supposedly paralleled the structure of memory. The final movement consisted of recall categories which indicated different kinds of text information that had been remembered (Drum and Lantaff, 1977).

Comprehension: Process and Product

One possible reason why comprehension has been so difficult to assess (and teach) is that it may be viewed as a process and a product. Perhaps one should speak of <u>comprehending</u> and <u>comprehension</u> - the latter designating the product.

As a product, comprehension occurs each step along the way in conjunction with the processes which contribute to it. Thus, readers may be interrupted during their reading to ascertain either the processes themselves or the resultant comprehension of the author's meaning at that point in time. It would thus appear that there might be a relationship between the various processes brought into play and the comprehension arising as a result of this interaction.

When comprehension is demonstrated by means of a recall, two sets of processes are involved: receptive and productive. The relationship between these processes and comprehension is illustrated in the following diagram.



Since a recall protocol is the result of two sets of processing, as Kintsch and VanDijk (1978) say, it "... is not simply a replica of a memory representation of the original discourse" (p. 374). This would occur only when information is stored verbatim in memory and retrieved in rehearsal fashion. Processes, which produce a change in the text information at the point of input are termed macrorules by Kintsch and VanDijk (1978) and are of three types: deletion of irrelevant information, generalization of a subset of information, or construction of a more global fact from specific information.

Kintsch and VanDijk (1978) also posit three major processes that may operate at the time a reader produces a recall. One of these processes is "reproduction" which results in the recall of information that is stored in a verbatim manner. "Transformations" of data result in reordering lexical substitutions, explication of coherence relationships, and perspective changes. Finally, a "reconstruction" of data brings various world knowledge to bear on the text data and results in (a) the addition of plausible details and normal properties, (b) particularization of events, or (c) specification of normal conditions, components, or consequences of events.

Comprehension Categories

The following categories are based largely on the work of Drum and Lantaff (1977), earlier work by the author (Fagan, 1978, 1980) and on two research studies that tested the earlier category system (Brake, 1981; Fagan and Malicky, 1981). Their purpose is to provide a structure to assess the degree of comprehension as indicated by a recall protocol. This may be achieved in four stages.

Stage 1: Eliminating Irrelevant Data

The first step is to isolate that information which will be analyzed. In order to do this it is necessary to eliminate two categories of data: mazes and recall conventions.

1. Mazes may be either of four types.

Filled Pause (Audible Noise): This consists of sounds which may be represented as ah, er, um, etc.

Filled Pause (Interjection): This consists of words or phrases which seem to mark time for the speaker before going on to the next thought. Examples are well, I think, yes, let me see, wait a minute, etc.

Filled Pause (Repeat): This includes the repetition of words or parts of words.

He saw a golf - a golf cart.
The little girl was per - perturbed.

The words or word part spoken initially are classed as the Repetition since it is assumed that once the speaker repeats, he ends the pause and continues to complete the utterance.

Correction/Edit: This consists of a jumble of words preceding a change in direction of what the person was about to say, or preceding a better choice of words.

He wanted to sell - to buy the golfballs.
The boy collected golfballs in the - around where - where he - on the golf course near where he was lived.

There will be only one instance of a type of hesitation pause/correction edit within a sequence. For example, if a word is repeated six times, it is one instance of a Filled Pause (Repeat); if several words are used before the child gets back in the right track, this is one instance of a Correction/Edit.

2. Recall conventions are concerned more with the narrating than with the actual content of the text. They may express a reader's limitations in not being able to remember or may include vague generalizations which appear to be a cover-up for lack of specific knowledge. Following are examples of recall conventions.

Text: (no specific referents)

Protocol: "Well it says that ..."
"And in the second paragraph the story says ..."
"That's all I can remember."

Protocol: "That was a good story."
"I found it hard to remember the part where all the characters were introduced."

Also included are phrases used by the reader to insert an event in proper sequence due to forgetting while recalling.

Protocol: Before that he set out his hooks for fishing.
(The "before that" acts as an addendum to insert information in its proper sequence after subsequent information had been recalled. A synonymous statement to "before that" would be "I forgot that".

Text: (detailing the advantages of heat)

Protocol: Heat helps lots.

Text: (describing the manufacture of various items of clothing)

Protocol: They make dresses and stuff like that.

Stage 2: Choosing a Unit for Analysis

Different units may be chosen for analysis - proposition (Kintsch, 1974), syntactic proposition (Fagan, 1978), clause or t-unit (Hunt, 1965). An assumption made when choosing a unit is that this represents a meaningful division of information and that the reader may perceive this unit when comprehending and/or recalling information. Since it cannot be determined with definitiveness which unit operates in this manner (in fact it is likely that different units may be processed at different times), the unit chosen for analysis will have different implications when interpreting the results obtained. For example, if the smallest unit is chosen - the syntactic proposition - then it is easier to determine if this fits into a category since verbatimness, synonymy, etc. is easier to analyse within this smaller unit than within a larger unit such as the t-unit. Consequently the interpretation of results would be weighted in terms of this category. If, on the other hand, the t-unit is chosen, then it is easier to judge if a summary has taken place since it is difficult to provide a summary of information within the brevity of the syntactic proposition. The clause unit is intermediate in length between the syntactic proposition and the t-unit/incomplete t-unit, and whereas it may not have the full advantages of either of these, it also does not have their full disadvantages.

In order to isolate clauses, it is suggested that the protocol first be divided into t-units and incomplete t-units (Fagan, 1978) which are defined as follows:

T-unit: This is a single independent prediction (main clause) together with any subordinate clauses that may be grammatically related to it. It may be a single or a complex sentence, but not a compound sentence.

In dividing a passage into t-units, one approach is to consider you are editing the transcript and are directed to rewrite as sentences according to the definition above. Where there is a compound sentence, divide before the connecting conjunction (and, but, etc.) and begin the next sentence with the conjunction. Do not change any words, but bracket these words which do not fit into the regular flow of language that make up the t-units (i.e., mazes).

Further guidelines for segmenting t-units are:

1. When a quote consists of more than one principal clause, only the first one is included with the words that identify the speaker.

   e.g. /Christopher said uncle when shall we get there/ it's such a long walk/

2. Having a t-unit within a t-unit is possible.

   e.g. /and he (/now he was scared/) told the captain ...

3. When the meaning of a passage indicates that a subordinate conjunction has been omitted, the clause involved does not form a new t-unit.

   e.g. /he decided that he should go cause there was nobody around and (cause) there was stuff ...?

4. "Yes" is included in the succeeding t-unit if the following statement is an elaboration of the answer; otherwise, it is considered to be an incomplete t-unit.

   e.g. /yes I guess you missed .../

   /yes /what do you want it for/

5. Intonation may determine the location of the boundary when a phrase, structurally, can be attached to either the preceding or subsequent t-unit.

   e.g. "I think" as in:

   /he went I think/ he said he planned to anyway/

6. Expressions like "I think", "I believe" are considered part of the t-unit if they are integral to the statement as for example:

   /I think he went said John/

   If the expression appears to be idiosyntactic to the speaker, the words are considered a "holder" type maze and are not counted as part of the t-unit.

   e.g. /Floods cause much damage/ (I think)

Incomplete t-unit: This consists of a group of words which do not form a complete independent clause but which are necessary to the ongoing flow of language. Since it does not form a complete independent clause, it is different from a t-unit. It may be lacking a subject, a verb, object, or complement, or any combination of these.

The incomplete appears to serve either of four functions: specifying particular information; elaboration of an antecedent; making additional comments on a topic; or establishing a referent for an ambiguous item.

He pushed one guy down in the water, pushed him on the ground, started punching him.

So he got fed up with this kind of deal, everyone chasing him.

And so the man is looking, couldn't find him.

He'd sell it to them, the balls.

An analysis of a transcription is given below.

He asks them for four golf balls//or he's gonna put his boots into the river//(and, and) (um) (he gave them) // the boy gave them four (four) (un) golf balls//they drop his boots anyway/ because they are mean//he goes back looking for them//goes home (because after) (um)//he had a dream//...

T-units //	6
Incomplete t-unit ____	1
Filled Pause (Audible Noise)	3
Filled Pause (Repeat)	2
Correction/Edit	2
Clauses ../ and .//	7

Stage 3: Comprehension Categories

A. Text Exact

This category includes information from the text in its exact form or with minimal variations. It is assumed that this information was stored in rote fashion or is automatically constrained by other information and is "reproduced" in a similar state.

A1. Verbatim Recall

The information is a direct recall of the lexical items of the text.

Text: The boys were late for school.

Protocol: The boys were late for school.

Substitution of a determiner, a verb form or a function word which does not change the meaning of the unit will also be placed in this category.

Text: He chased the animal.

Protocol: He chased an animal.

Text: People were waiting at the door.

Protocol: People were waiting by the door.

Text: The student had been absent many times.

Protocol: The student was absent many times.

A2. Partial Recall

A significant concept(s) (noun, verb, attribute) is/are omitted in the verbatim recall.

Text: After robbing the store, the convicts raced for their car.

Protocol: The convicts raced for their car.

Text: The children had never seen such a tiny colt.

Protocol: The children had never seen such a colt.

This category would also include fragmented units which are not mazes and although not semantically complete do indicate that the reader has noted and attempted to retrieve concepts which continue the story line.

Text: The stranger told him to follow his advice and put his lines at the spot indicated.

Protocol: The stranger told him ... that he would put ... all his lines ...

B. Text Specific

In this category is placed information recalled that has specific references in the text. The reader may have "transformed" some of this information by reordering or substituting lexical items.

B1. Substitution of Pronouns

A pronoun is used in place of a noun when the noun referent is present elsewhere within the text. All other items in the unit are verbatim.

Text: People were very kind to the stranger.

Protocol: They were very kind to the stranger.

Text: The truck went off the road about one half mile from the settlement.

Protocol: It went off the road about one half mile from the settlement.

B2. Synonymy of Elements

The operational definition of synonymy is context dependent and may refer to (a) substitution of one word for another so that semantic and grammatical features are preserved, (b) the sequencing of lexical items from a unit such as the preposing of prepositional phrases or substituting an active for a passive, and (c) a paraphrase of the original unit which in the subjective opinion of the scorer has the same conceptual referents and has definite correlates in the text unit.

Text: fish

Protocol: salmon

Text: The house was on fire.

Protocol: The house was burning.

Text: In twos and very slowly the mourners walked in procession.

Protocol: The mourners walked in procession very slowly and in twos.

Text: He said good night and went to bed.

Protocol: He decided to call it an evening and said good night.

C. Text Entailed

The information retrieved is (a) a paraphrase of or synonymous with the information input, but the unit of recall includes information from more than one unit of input, or (b) a superordinate statement subsuming information from more than one text unit. It may be assumed that at the time of comprehending the reader "constructed" information and may still "transform" it at the point of recall.

C1. Synthesis

A synthesis statement is a compilation of at least two units of information. It may not contain either of the specific units summarized but may be expressed in a hierarchical or superordinate category or by a label generalizing the events summarized, such as a main idea, theme, or moral.

Text: He quickly raced to the landing, stripped off his clothes and jumped into the icy water to rescue the frightened little boy.

Protocol: He did a very brave deed.

Text: While visiting her Aunt Lizzie at the farm last weekend, Teri helped harvest some carrots, peas, zucchini and tomatoes.

Protocol: Last weekend, Teri helped her Aunt harvest some vegetables.

C2. Summary

A statement is a summary if it relates information from at least two units in the text in an embedded form, that is some of the lexical items or units of information are deleted during this process. In summarizing the exact words or their synonyms may be used.

Text: She jumped into the icy water. She was trying to save the swimmer who was in trouble.

Protocol: She jumped into the icy water to save swimmer in trouble.

Text: The stranger pitied the man. He had tried to help but had not been very successful. The stranger felt deep remorse but knew that the man would have to settle his own problems without outside interference. The stranger stared quietly as the man walked slowly away.

Protocol: The stranger pitied the man who walked slowly away.

D. Text Experiential

This information is added by the reader to fill in gaps in the text data. The reader is "reconstructing" information based on prior knowledge which may be of world events such as rodeo, or from having read or listened to other texts.

D1. Inference

An inference may include either a logical reasoning or an instantiation, that is, the filling in of information suggested by the text information but not specified. The latter is often referred to as a pragmatic inference and may be stated in a contradictory form and still make a plausible statement.

Text: John and Bill left for school at the same time and walked at the same rate. But Bill lived several blocks farther away from the school than John. John just reached the school on time. He hoped that Bill would still be able to play ball that evening.

Protocol: (Logical): Bill was late for school.

Text: The mother bundled the children in their parkas, scarves and mittens. She was sure they all had a hot lunch as they left for school.

Protocol: (Pragmatic): It was a cold day.
(Contradiction): It was not a cold day. Perhaps the mother was mentally deranged.

D2. Case Related Information

This includes the expansion of permissible sequences that are assumed extensions of a unit of information in the text. This subcategory describes appropriate prior knowledge of similar content.

Text: Ground corn

Protocol: Ground corn with a rock

Text: The captain climbed the mast of the distressed ship and signalled for help.

Protocol: The captain climbed the mast of the distressed ship and signalled for help with his flag.

Text: Used for etching.

Protocol: Used for the etching of drawings.

D3. Experiential Intrusions

This information is related to the theme of the text passage but is not specifically suggested by a particular unit in the text. It does not convey the text information but is an addition of information from the reader's background.

Text: The little boy had disobeyed his mother. She had told him to wait by the car while she went back to the store for the other bag of groceries. Now she could not find him anywhere.

Protocol: One time I saw this woman looking everywhere for her little boy. He went up the escalator when she wasn't looking.

D4. Storyline additions

These units include additions to the information within the storyline. The origin of these additions appears to be based on the reader's experience with stories and the kinds of goals or actions which are appropriate in a particular context and thus are predictable from the story information. Also included are expressions that indicate saying, thinking, etc. which are not specifically stated in the text. These are not inferences since they are not immediately constrained by a specific part of the text.

Text: (describing a character's actions that led up to making a decision)

Protocol: He thought he would catch the next train and finally settle the matter completely.

Text: The stranger saw that the man was weak and finally dug a hole through the ice for him.

Protocol: The man said "I am not able to dig the hole." But the stranger said "You got to keep trying and trying." The man said "I just can't do it."

E. Text Erroneous

The protocol units involve the use of text information which the reader has processed incorrectly either at the time of comprehending or at production of the recall.

E1. Errors in dates and proper names

These errors constitute memory errors or are due to lack of attention to the text. The appropriate slot is there but is inaccurately filled.

Text: Sir Wilfred Laurier

Protocol: Sir Wilfred Bennett

Text: 1864

Protocol: 1872

E2. Erroneous expansions/additions

These units (i) separate attribute/argument phrases into units that are conceptually wrong, (ii) expand a unit of information in an erroneous way (D2), or add information that is incorrect in terms of world knowledge of the events mentioned, or is contradictory with information in the text. These may be due to lack of experience with the content and/or the ambiguity of the text.

Text: They ground corn.

Protocol: They ground corn by heating it.

Text: The lobster's claws.

Protocol: The lobster claws.

E3. Inaccurate/incorrect synthesis

Information from different units of the text is (i) designated by an inaccurate superordinate referent, or (ii) is generalized in a way which does not convey the gist of the passage.

Text: We shouldn't always knock computers when they seem to make an error on our accounts. Granted we might be upset when our balance is nil and the computer still insists that we send a check for $40.00. However, if computers were assigned to do the many menial tasks of administrative affairs and leave more time for humans to use their intelligence to solve the more significant problems, then computers and humans would be compatible and would coexist in harmony.

Protocol: Computers are frustrating.

Text: While visiting her Aunt Lizzie at the farm last weekend, Teri helped harvest some carrots, peas, zucchini, and tomatoes.

Protocol: Last weekend Teri helped her Aunt harvest some fruit.

E4. Inaccurate/incorrect summary

In combining information the reader confuses information about a particular referent.

Text: As the man was scraping snow off the ice he saw someone standing beside him. The man said to the stranger "I don't think I can finish visiting my lines because I am so cold and hungry." The stranger said he would help. He dug new holes for the man and also showed him where to get caribou.

Protocol: A stranger came along. He helped the man dig holes through the ice and then they saw a caribou herd go by.

Text: Mrs. Gray sat down to watch the TV announcer on her weekly show about gardening.

Protocol: Mrs. Gray sat down to watch the TV announcer on his weekly show about gardening.

Text: The dogs lay down and refused to move. The man dragged the sled all the way to the cabin.

Protocol: The dogs dragged the sled to the cabin.

E5. Faulty Inference

The reader draws an incorrect inference from the information given in the text.

Text: Mrs. Gray knew it was two o'clock because she could hear Henry, her parrot squawking. He wanted to watch his favorite TV program. But Mrs. Gray thought that too much TV was bad for Henry's eyes so she told him to rest instead. He squawked even louder so she finally turned on the TV set. After Henry's show was over, she stayed to watch a show on cooking.

Protocol: Mrs. Gray came in from the garden to watch her TV show.

Stage 4: Weighting

The matter of assigning a weight in points to the unit chosen is an arbitrary decision and should be determined by the purpose of the analysis.

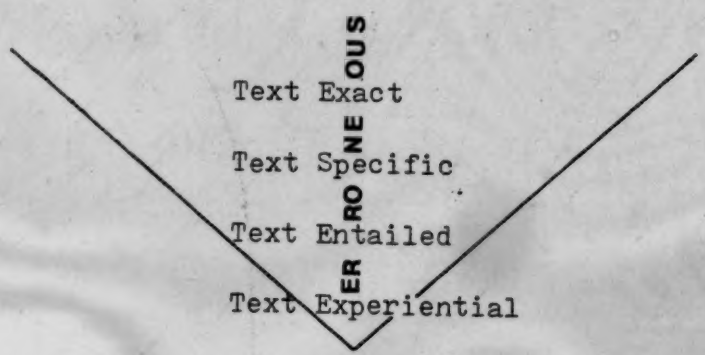
It is suggested that the weighting be assigned on the basis of the number of categories evident in the reader's recall as opposed to the number of units recalled. That is, one unit may be assigned to two categories. The rationalization for this is that the analysis is hopefully indicative of what the reader was doing when reading. Consequently if one unit (clause) indicates that the reader used a Pronoun Substitution (B1) and Case Related Information (D2), then this should be noted.

An incomplete t-unit is sometimes not a clause (lacks a finite subject or verb) but is considered equivalent to a clause unit for scoring purposes.

Validity and Reliability

The comprehension categories have been based on the construct of reading comprehension (as measured by a recall) as involving the reception and production of information which is generated from an interaction of the text data and the reader's prior knowledge. As indicated in the description of the categories, certain assumptions about the underlying processes that may contribute to that category are made based on the work of Kintsch and VanDijk (1978).

The categories may be sequenced in terms of the proportion of text data and prior knowledge that may have contributed to the recall. This sequence may be illustrated by the following diagram with the amount of text decreasing from text exact to text experiential.



In order to obtain adequate reliability, the following guidelines are suggested:

1. Each scorer be thoroughly familiar with the categories, their definitions, and examples.
2. A number of protocols be scored as points for discussion before the independent scoring is done. At this point, definitions or examples may need to be further clarified.
3. If a unit is not readily assigned to a category, then the scorer should engage in the process of category elimination.

4. Posing a question on the unit being analysed may help clarify the category which represents what the reader was doing. For example, if the unit supposedly indicates Text Verbatim, then an appropriate question for the reader is "Tell me if this was present in what you just read." If the unit is suspected as being Case Related Information, then a question might be "Is this true about grinding corn? Do they pound it with a stone?" For an inference the question posed might be "What information in the story suggests this statement (the inference)?" For a synthesis, the question "Can you elaborate on this?" might be considered. The scorer will have to judge whether or not the reader could respond to such questions. If so, then it is plausible that this unit belongs within the category indicated.

Using the above guidelines, five recall protocols comprising 187 clauses were assigned to categories. The interrater reliability in terms of percentage agreement were:

Category	A	98.5
	B	97
	C	93
	D	96
	E	95

Concluding Statement

In order to assess comprehension, one must consider both the process (reception and production) and the product. It is difficult to get at the former which must be inferred. The comprehension categories provided in this article hopefully will allow both factors to be taken into account.

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APPENDIX D

Instructional Level Performances

Standard Reading Inventory (McCracken, 1966)

Able Readers

No.	READING COMPREHENSION (Form A)			LISTENING COMPREHENSION (Form B)		
	% Unaided Recall	% Total Recall	Instruct. Level	% Unaided Recall	% Total Recall	Instruct. Level
1	50	70	4.0	70	75	5.0
2	25	75	4.0	70	90	6.0
3	30	95	3.5	30	70	6.0
4	70	85	3.5	45	85	6.0
5	70	80	4.0	50	80	3.5
6	70	95	3.5	45	95	4.0
7	80	90	3.5	35	75	4.0
8	70	90	3.5	55	90	3.5
9	70	90	4.0	50	95	6.0
10	60	80	6.0	70	80	6.0
11	30	85	7.0	70	85	7.0
12	80	90	4.0	55	75	4.0
13	35	70	5.0	70	80	7.0
14	40	100	7.0	75	75	7.0
15	80	90	4.0	60	70	6.0
16	70	80	3.5	60	95	3.5
17	80	90	3.5	70	90	3.5
18	70	100	3.5	65	80	4.0
19	75	90	3.5	65	95	3.5
20	75	100	3.5	80	90	3.5
Means	61.50	87.25	4.2	59.50	83.50	4.95

Standard Reading Inventory (McCracken, 1966)

Less Able Readers

No.	READING COMPREHENSION (Form A)			LISTENING COMPREHENSION (Form B)		
	% Unaided Recall	% Total Recall	Instruct. Level	% Unaided Recall	% Total Recall	Instruct. Level
21	70	70	4.0	60	70	4.0
22	40	90	2.5	30	70	3.5
23	85	100	2.5	70	85	3.5
24	75	85	3.5	85	95	3.5
25	85	95	3.5	70	95	3.5
26	50	70	2.5	75	95	3.5
27	70	80	2.0	45	75	3.5
28	85	85	3.5	45	70	4.0
29	70	80	2.5	30	85	3.5
30	85	100	3.5	60	90	3.5
31	35	70	5.0	50	80	3.5
32	75	80	2.5	85	95	3.5
33	50	70	3.5	30	90	4.0
34	60	80	4.0	65	75	7.0
35	75	85	3.5	65	75	3.5
36	25	75	4.0	60	80	4.0
37	85	95	3.5	50	85	6.0
38	45	95	4.0	45	85	4.0
39	70	75	2.0	30	70	3.5
40	75	100	2.5	75	100	3.5
Means	65.50	84.00	3.225	56.25	83.25	3.925